

**Evaluation of A.I.D.
Child Survival Programs
*Malawi Case Study***

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TABLE OF CONTENTS

Preface	v
Summary	vii
Glossary	xiii
Map of Malawi	xv
1. Introduction	1
2. Background	3
The Malawi Setting	3
Population Size and Distribution	3
Fertility	4
Mortality	4
Economy	4
Education	5
Water, Sanitation, and Housing	5
Health Care Delivery and Constraints	6
Health Care Delivery System	6
Constraints on the Delivery of Health Care	6
3. A.I.D.'s Approach to Child Survival in Malawi	9
USAID/Malawi's Child Survival Program	9
USAID/Malawi's Evolving Child Survival Strategy	12
4. Effectiveness	14
Effectiveness of Service Delivery Interventions	14
Water Supply, Health Education, and Sanitation Promotion	14
Malaria Control	16
HIV/AIDS Control	17
Child Spacing	18
Integrated Maternal and Child Health Services	18
Immunization	19
Control of Diarrheal Diseases	21
Effectiveness of Capacity-Building Efforts	21
Training of Health Surveillance Assistants and Paramedics	22

Planning	22
Information	23
Communication	24
5. Efficiency	25
Quantitative Analysis: Benefits and Costs	25
Conceptual Framework of the Analysis	25
Approach and Results of the Quantitative Analysis	26
Qualitative Assessment of Economic Efficiency	28
Economic Rationale of the Child Survival Program	28
Allocation of Program Funds	28
Health Sector Efficiency	28
6. Sustainability	30
Institutional Sustainability of Projects Completed Before 1989	31
Sustained Activities and Achievements	31
Presence of Characteristics Associated With Sustainability	33
Potential Sustainability of Current Projects	34
Promoting Health Interventions for Child Survival Projects	34
Private Voluntary Organization Child Survival Grants	35
Financial Sustainability	36
Assumption of Program Costs by the Malawi Government	37
Cost Recovery	37
Privatization of Child Survival Services	38
7. Impact	39
Infant and Child Mortality and Morbidity	40
Impact of USAID/Malawi Program on Child Survival	43
8. Relevance	46
Service Delivery Interventions	46
Capacity-Building Interventions	46
9. Conclusions	49

Appendixes

- A. Analysis of Sustainability
- B. Analysis of Effectiveness
- C. Infant and Child Mortality and Morbidity in Malawi

Bibliography

PREFACE

This report on the Agency for International Development's (A.I.D.) child survival program in Malawi concludes the six country case studies conducted for the Center for Development Information and Evaluation's Child Survival Assessment. The principal objectives of the Malawi investigation were (1) to identify and evaluate the longer term effects of A.I.D.-supported child survival activities on infant and child morbidity and mortality and on primary health care service delivery and (2) to examine A.I.D.'s child survival assistance in terms of effectiveness, efficiency, sustainability, and relevance.

The four-person study team that traveled to Malawi in March 1992 gratefully acknowledges the helpful briefings and other assistance of the following people: representatives of the Government of Malawi, especially officials of the Ministry of Health and of the Water Department of the Ministry of Works; representatives of private voluntary organizations and other donor agencies; and the USAID/Malawi Mission Director, Health and Population Officer and his associates, Program Officer, and other Mission staff. Their valuable assistance greatly facilitated the team's work.

SUMMARY

This Technical Report summarizes the findings of an evaluation of the Agency for International Development's (A.I.D.) child survival program in Malawi. The report concludes the last in a series of six country evaluations performed by A.I.D.'s Center for Development Information and Evaluation (CDIE) and focusing on A.I.D.'s worldwide Child Survival Program. The other five countries in the series are Bolivia, Egypt, Haiti, Indonesia, and Morocco. The main purpose of the evaluation is to provide a basis for a final report synthesizing the major program-level conclusions and "lessons learned" from the case studies for senior A.I.D. decision-makers who will be considering future policy directions for and investments in child survival activities.

The objective of A.I.D.'s Child Survival Program is to reduce the average infant mortality rate in A.I.D.-assisted countries from the 1985 figure of 97 deaths per 1,000 live births to 75 deaths or fewer by the year 2000. According to a 1987 census, Malawi's infant mortality rate is 159 deaths during the first year of life for every 1,000 live births. About 25 percent of Malawian children die before age 5. Estimates based on a 1984 survey indicate that although Malawian children constitute about 20 percent of the population they account for about 57 percent of deaths.

The USAID/Malawi child survival program focuses primarily on institutional capacity building, that is, on helping to strengthen Malawi's health care sector so it can be self-sustaining once the Agency is no longer involved. Areas that receive A.I.D. capacity-building assistance are health-personnel training, health planning, research, epidemiology, and health information and education. USAID/Malawi has integrated child survival with broader health and population program objectives. Complementing A.I.D.'s support for long-term capacity building is A.I.D. support for selected direct health-care interventions that address more immediate health problems, including malaria, HIV/AIDS, and high-risk births.

A.I.D.'s assistance in capacity building and service delivery is heavily oriented toward preventive health measures rather than curative care. During the 1980s, the Malawi Government never allocated more than 7 percent of its health recurrent budget to preventive services. Neglect of preventive services has

contributed to the high prevalence of otherwise preventable diseases that must be treated by curative facilities, which are crowded and whose staffs are overextended.

USAID/Malawi's grant assistance to the health sector and child survival totals \$44 million over the planned life of more than 20 projects ongoing as of 1990. They include integrated and multisectoral health and child survival activities, child survival efforts of the private-sector, population and family planning projects, and AIDS prevention activities.

The child survival program in Malawi confronts a daunting array of diseases contributing to high mortality and morbidity rates. Malaria is the most prevalent disease reported in all age groups and the prime cause of mortality and morbidity among children. Malaria and malaria-linked anemia account for 32 percent of child (under age 5) deaths and 41 percent of child hospitalizations. Although pediatric AIDS is not yet a major factor in child survival, the disease is spreading rapidly; the Ministry of Health projects a 34-percent increase in AIDS-related child mortality by 2002. Chronic malnutrition affects 56 percent of children under age 5 in rural Malawi; nutritional deficiencies account for 17 percent of child mortality and for 9 percent of child hospitalizations. Other diseases that seriously affect child mortality and morbidity include pneumonia, measles, and diarrhea. Moreover, low levels of education and literacy, especially among women, impede attempts to improve hygiene, nutrition, and health practices in Malawi.

The CDIE team evaluated the development results of the child survival program in Malawi in terms of effectiveness, efficiency, sustainability, impact, and relevance.

Regarding *effectiveness*, the team evaluated service delivery and capacity building. Service delivery findings are as follows:

- *Water supply, health education, and sanitation promotion.* Between 1980 and 1988, A.I.D. supported construction of 18 piped water schemes, reaching a population of 421,800 people in more than 1,400 villages. Another project provided community-level health education, latrines, and washing slabs. In the 13 geographic areas where this project was active, 64 percent of families had latrines after the effort was completed, compared with 35 percent before.
- *Malaria control.* Since 1984, A.I.D. has been the primary donor to the Malawi malaria control program, including a national effort in 1985-1989, which emphasized the use of chloroquine. The drug was

successful initially and is available throughout the country. But the incidence of malaria is increasing again with the recent spread of chloroquine-resistant strains. A.I.D.-supported research prompted the Malawi Government to switch to a new drug, Fansidar, but implementation of this change is just beginning and the drug's effectiveness is not yet known.

- *HIV/AIDS control.* Through various small projects, A.I.D. provides technical support, in-service training for health workers, AIDS education in schools, monitoring and surveillance activities, and condoms. The program has generated a widespread increase in AIDS awareness. From 1990 to 1991, the number of A.I.D.-provided condoms increased to 3.7 million per year from 200,000.
- *Child spacing.* A.I.D. supports contraceptive supply, computer modeling, policy dialogue, voluntary surgical contraception, and operations research in community-based contraceptive distribution. More than 900 health workers have been trained as child-spacing service providers, although only about 500 are currently providing this service. The number of health facilities offering child-spacing services has grown from 1 in 1984 to 210 in 1991, representing about one-third of Malawi's 748 health facilities.
- *Maternal and child health services.* Among other projects, the Agency provides grant funding to five private voluntary organizations (PVOs) to provide integrated maternal and child care services at the community level in different geographic regions.
- *Immunization.* Immunization coverage reached about 80 percent in 1990. A.I.D. does not routinely provide direct support for the operational expenses of this program because other donors support it adequately. In 1992, however, the lead donor, UNICEF, faced funding problems, and A.I.D. made a grant to the United Nations International Children's Emergency Fund (UNICEF) covering about one-third of Malawi's annual budget for immunizations. Without this support, national coverage rates could have dropped to 60 percent or lower.
- *Control of diarrheal diseases.* Use of oral rehydration therapy (ORT) for controlling diarrheal diseases is low in Malawi, and there is evidence of a loss of interest in ORT. A.I.D. may decide to join UNICEF and other donors in an effort to improve ORT services.

Although direct support for the delivery of health services is an important part of the A.I.D. Child Survival Program, A.I.D.'s main focus is institutional capacity building. Activities to develop institutional capacity, unlike subsidies for direct delivery of services, produce long-term benefits. To assess the effectiveness of capacity building in terms of "capacity built" is premature for a program as young as Malawi's. The evaluation team's findings are therefore preliminary.

A.I.D. supports capacity-building efforts in the Ministry of Health in four areas: training, planning, information, and communication. A.I.D. supports training for new health surveillance assistants, a category of community-based health workers with broad responsibilities for preventive and basic health services and the collection of health information. Reports concerning the quality of the 6-week training program have been generally positive. The Agency is also supporting new in-service paramedical training in primary health care, child spacing, and HIV/AIDS.

To strengthen the Ministry of Health's planning capabilities, A.I.D. is helping to establish a Manpower Development Unit to solve critical staffing problems. At the time of the CDIE evaluation, the unit had been formally established, staff had been hired, and data collection and training activities had begun. A.I.D. is also assisting various Ministry of Health administrative units to develop realistic annual workplans. In addition, the Agency assists the Ministry in three areas relating to information: research, epidemiology, and health information. At the request of the Ministry and other agencies, A.I.D. support of communication involves funding the production and pretesting of health education materials for child survival.

Regarding the *efficiency* of the child survival program, the evaluation confirmed that economic growth can benefit from decreases in child mortality and morbidity and that the returns on A.I.D.'s investment in child survival appear to justify the investment that A.I.D. is making.

Financial and institutional *sustainability* of child survival services is the major objective of A.I.D. assistance to Malawi's health sector. Currently, primary care is heavily dependent on external donors, because Malawi Government resources are primarily being used to support curative hospital health services. The success of A.I.D.'s long-range strategy to promote changes that will bring about more sustainable primary health care will not be measurable until the late 1990s. The A.I.D. program is supporting three initiatives to improve the prospects for financial sustainability. The first is A.I.D. policy dialogue with the Malawi Government to encourage increased budgetary support for health so that the Government can eventually assume the recurrent costs of project activities. The second initiative is an effort by A.I.D. to increase cost recovery through fees

for curative services in the three major hospitals. The third approach to financial sustainability is private sector provision of services. A.I.D. supports several PVOs through grants for child survival activities. In addition, the Ministry of Health provides an annual subsidy to the Private Hospital Association of Malawi, which currently provides one-third to one-half of health services. Those private facilities charge fees for curative services, but their preventive services are free as a result of a government subsidy. Nonetheless, their financial status is precarious.

Impact refers to long-term improvements in child survival conditions. The key indicators of impact are infant and child morbidity and mortality rates. Despite serious data problems, the team found significant progress against some causes of infant mortality. Malawi's immunization rates are higher than those in most of East and Southern Africa. As a result, rates of infection have declined. For example, between 1985 and 1989, the rate of measles infection among children under age 5 declined by about half, from 707 to 327 cases per 10,000 children. Similarly, morbidity rates from diarrheal diseases showed a 50-percent decline between 1980 and 1989.

Some of A.I.D.'s child survival interventions seem to be having positive permanent effects, independent of local institutions and other donors. For example, preliminary evidence indicates that the incidence of waterborne diseases, such as schistosomiasis, trachoma, and childhood diarrhea, has declined with the use of A.I.D.-supplied piped water. However, statistics are so poor and the program is so new that conclusive, empirical evidence of overall impact will not be available for several years. The possible impact of A.I.D. activities to prevent HIV/AIDS transmission cannot yet be assessed because of the early stage of the disease in Malawi. The potential impact on infant and maternal mortality of A.I.D.-supported child-spacing activities is considered very positive.

Unfortunately, progress in some areas has been offset by new health problems that are causing infant mortality to rise. Evidence suggests that infant mortality is actually increasing due to the resurgence of chloroquine-resistant malaria. Mortality from malaria began to increase rapidly in the late 1980s, growing from 11 percent of child deaths in 1985 to 19 percent in 1990. Immediate, effective solutions to the malaria problem are not in sight. The advent of the AIDS epidemic diminishes hope for future improvement in child survival.

Relevance addresses the question of whether interventions target critical child survival problems in Malawi and take into account local conditions. The evaluation found that the service delivery and capacity-building interventions of the Malawi program are relevant. Given the health environment in Malawi, the current approach of focusing on capacity building as an indirect child survival

intervention, complemented by direct service-delivery interventions for the most critical health problems, shows the most promise for long-term, sustainable improvement in child survival.

The evaluation team came to the following *general conclusions*:

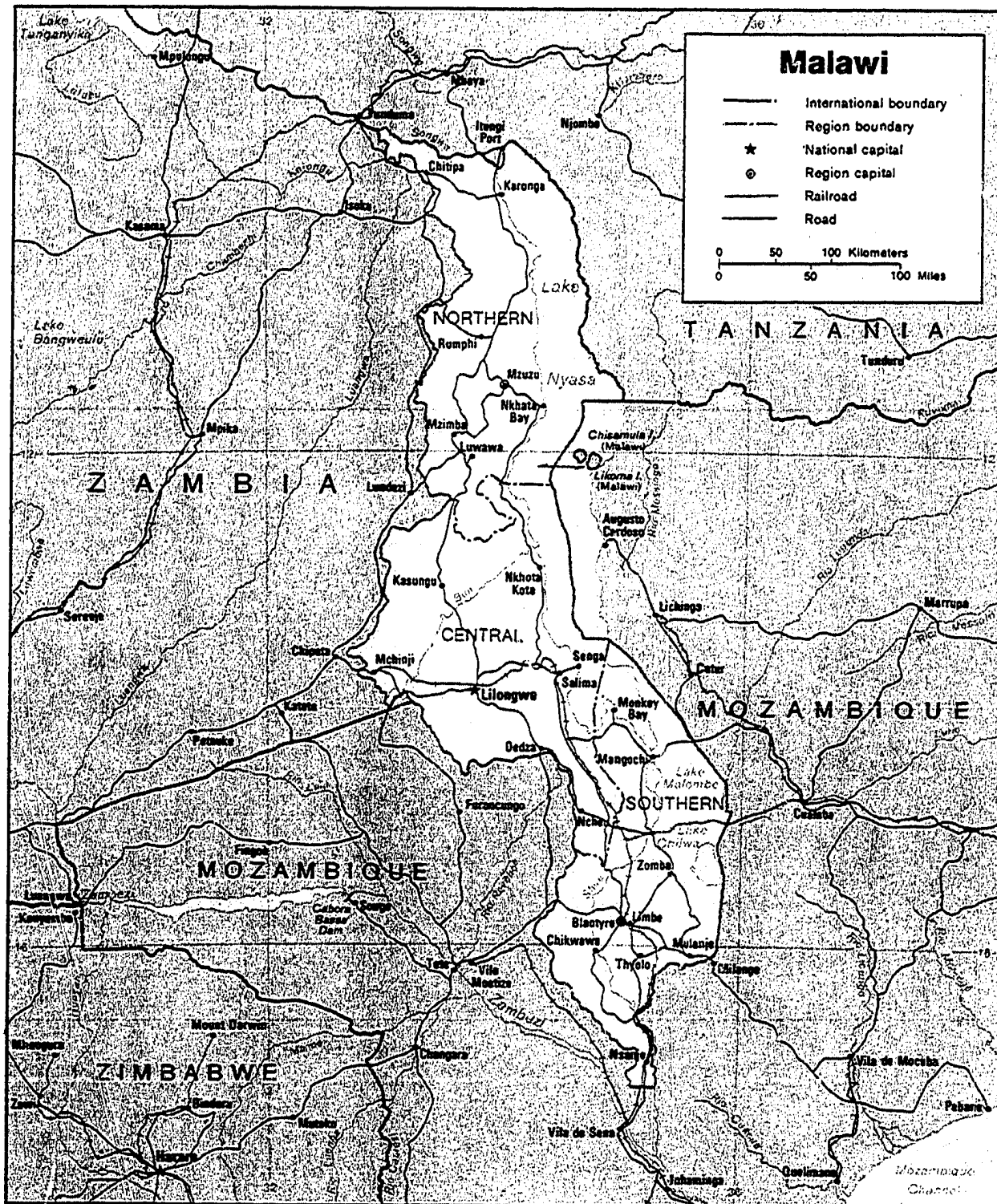
- Female illiteracy is a critical obstacle to child survival.
- The shortage of trained health personnel severely limits the quality and quantity of child survival services.
- Child survival services have benefited from integration within the broader national health portfolio.
- The presence of many different donors creates a management burden for the Malawi Government.
- HIV/AIDS is a major threat to child survival.
- Interest in controlling diarrheal diseases has declined.
- Malaria is the major barrier to further decline of infant and child mortality.
- Donor support for child survival is unpredictable.
- In economic terms, child survival is a justifiable investment.
- Sustainability is the most important but also the most difficult objective of A.I.D. child survival assistance.
- Institution building and integrated health programs can be effective approaches to assisting national child survival programs.
- Poor measurement of results weakens child survival programs.

GLOSSARY

ACSI	A.I.D. Child Survival Initiative
A.I.D.	U.S. Agency for International Development
ASHA	American Schools and Hospitals Abroad
CCCD	Combatting Childhood Communicable Diseases project
CDC	U.S. Centers for Disease Control
CDD	control of diarrheal diseases
CDIE	Center for Development Information and Evaluation, U.S. Agency for International Development
CS-HP	child survival, health, and population
EPI	expanded program for immunization
FY	fiscal year
GDP	gross domestic product
HEALTHCOM	Health Communications project
HESP	health (or hygiene) education and sanitation promotion
HIS	health information system
HSA	health surveillance assistant
K	basic monetary unit in Malawi
NACP	National AIDS Control Program
NGO	nongovernmental organization

ORT	oral rehydration therapy
PHAM	Private Hospital Association of Malawi
PHICS	Promoting Health Interventions for Child Survival project
PVO	private voluntary organization
SOMARC	Health/Contraceptive Social Marketing
Tambal	principal fractional unit of currency in Malawi
UNICEF	United Nations International Children's Emergency Fund
USAID/Malawi	U.S. Agency for International Development Mission in Malawi
VHV	village health volunteer

MAP OF MALAWI



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1. INTRODUCTION

This Technical Report presents the findings and management implications of an evaluation performed by the Agency for International Development (A.I.D.) Center for Development Information and Evaluation (CDIE) of the A.I.D. child survival program in Malawi. The Malawi study is one in a series of six case studies of A.I.D.'s Child Survival Program; the other five case-study countries are Bolivia, Egypt, Haiti, Indonesia, and Morocco. The six case studies are intended to serve as the basis for a final report synthesizing major conclusions and "lessons learned" for senior A.I.D. decision-makers who will be considering future policy directions for and investments in child survival activities.

One reason that CDIE selected Malawi for study is the nation's high infant mortality rate of 159 deaths during the first year of life for every 1,000 live births, according to a 1987 census. Malawi is a challenging "worst case," in light of A.I.D.'s programwide goal of reducing the average infant mortality rate to 75 deaths for every 1,000 live births in 22 "emphasis" countries. Another reason for selecting Malawi is the substantial effort by the Malawi Government, USAID/Malawi, and other agencies to enhance child survival.

The team that conducted the assessment in Malawi had contacts and interviews with USAID/Malawi's health and population officer, the Minister of Health, the staff of private voluntary agencies (PVOs) involved in child survival in Malawi, representatives of other donor agencies, officials of the Ministry of Works, and Government health workers, including health workers at rural hospitals and at fixed and mobile health operations in the Central and Southern Regions.

Data collection methods included document review, key informant interviews, health-worker interviews, group discussions, facility visits, and observation of clinics and their supply inventories. The team assessed health education skills through a role-playing process. Interviews and facility visits provided anecdotal and contextual information in instances where more systematic data were not available. The team conducted individual and group interviews with more than 120 health providers and mothers. Team members also observed clinic operations and completed inventories of equipment, personnel, and

supplies. Questionnaires were used for all interviews and standardized checklists were used for inventorying. These instruments are on file at CDIE for review by interested readers.

2. BACKGROUND

Various underlying conditions in Malawi affect the performance of A.I.D.-supported child survival activities. This section first explores some key factors, including the nation's population size, fertility, and mortality, and concludes with a description of Malawi's health care delivery and constraints.

The Malawi Setting

Malawi is a small, landlocked, sub-Saharan nation divided into three geographical and administrative regions (Northern, Central, and Southern). It covers 45,750 square miles and has a variety of climatic, topographical, demographic, and socioeconomic conditions. The nine tribes that make up the Malawian population result in some linguistic diversity, although 75 percent of Malawians speak Chichewa, one of the two official national languages. The other national language is English. Major religions are Protestant (55 percent), Roman Catholic (20 percent), Muslim (20 percent), and Animists (5 percent).

Malawi gained independence in 1964 and remains a one-party state. It is governed by Life President Dr. H. Kamuzu Banda.

Population Size and Distribution

Malawi's estimated 1991 population of 9.6 million is one of the fastest growing in the world and region. Almost 90 percent of inhabitants live in rural areas, according to the 1987 census. Most densely populated is the Southern Region, with more than 100 persons per square kilometer.

Between 1966 and 1987, the population nearly doubled to 7.98 million, with 1.65 million children under age 5 and 1.77 million women of reproductive age. Even if population growth begins to slow soon, children under age 5 could number over 3 million in 20 years. Natural population growth is supplemented by an influx of refugees. The Government of Malawi estimates (1991) that 900,000 refugees settled in Malawi between 1987 and 1991.

Fertility

Malawi's high fertility and rapid population growth strain resources in health care, nutrition, housing, education, and public services. Based on the 1987 census, the estimated crude birthrate is 41 live births per 1,000 population. Recent projections estimate the rate at 45. Women average about 7.6 births during their lifetimes.

Use of family planning services remains low. The contraceptive prevalence rate is about 5 percent. The fact that marriage is nearly universal and occurs at an early age (17.4 years is the female median age at marriage) also contributes to high fertility.

Mortality

As health services expanded and health conditions improved, the crude death rate in Malawi declined from about 27 deaths per 1,000 population in the 1960s to an estimated 21 in 1987. However, recent indications suggest that the resurgence of malaria and the spread of AIDS has slowed or reversed the improvement in infant mortality.

In contrast to the 1960s, when an estimated 33 percent of all children died before age 5, today about 25 percent of children die before age 5. Despite this improvement, infant and child mortality rates remain among the highest in sub-Saharan Africa. Estimates based on the 1987 census indicate 159 infant deaths per 1,000 live births occur during the first year of life.

Economy

During the 1980s, economic growth was not as stable as in previous years when the economy grew at an average annual rate of 5.5 percent. Only in recent years has gross domestic product (GDP) resumed an upward trend (Government of Malawi undated c). Infusions of donor capital, not true structural factors, may account for a good share of the GDP growth. A primary concern is that growth to date is not sufficiently broad to sustain itself.

Population growth, caused primarily by high fertility, has outstripped economic growth, resulting in a decline in real per capita income. Real per capita income grew at an average annual rate of about 1.5 percent in the past several years, in contrast to a 3-percent rate during the first years after independence. In 1988, the World Bank considered Malawi the world's poorest

country, with annual per capita income of about \$160 (SOMARC Research Department 1991).

The economy is highly dependent on agriculture, which constitutes about 40 percent of GDP and provides income and employment for approximately 90 percent of the population. Crop production fluctuates with changing weather conditions, and yields are declining as rapid population growth places increasing pressure on arable land. Also constraining economic growth are oil shocks, transportation disruptions, the influx of refugees, inadequate domestic and external resources, and deteriorating trade terms and markets.

Education

According to the 1987 census, about 42 percent of people aged 5 or older are literate in Chichewa, English, or both. Literacy among females (32 percent) is much lower than among males (52 percent). The primary school enrollment rate of about 43 percent has been stable during the past decade, although the number of primary school students has grown rapidly. Less than 5 percent of eligible children attend secondary school.

Water, Sanitation, and Housing

Malawi has placed emphasis on developing an adequate water and sanitation system. An estimated 40 percent of the rural population has access to safe drinking water, primarily from wells. Because of rapid growth of urban areas, main piped water systems are inadequate to serve the needs of the population whose primary source of drinking water is communal standpipes.

An estimated 65 percent of all households have some form of toilet (65 percent of the rural population and 95 percent of the urban population). Hygiene education lags technical advances.

Most of the 1.6 million rural households reside in traditional structures of rammed-earth or burnt-brick walls with grass thatch roofs. Of the 299,000 urban households, most were located in unplanned or squatter locations.

Health Care Delivery and Constraints

Health Care Delivery System

Three major agencies provide health care in Malawi: the Ministry of Health, the Private Hospital Association of Malawi (PHAM), and the Ministry of Local Government. In 1990, these three agencies and other smaller groups operated about 744 health facilities, as follows:

- The Ministry of Health has primary responsibility for developing policies, strategies, and programs for health care as well as for providing services. The Ministry operates a three-tiered health system. At the tertiary level are 24 district hospitals and 3 central hospitals, which provide 6,815 beds. Hospital use is high. At the secondary level, the Ministry provides curative care; prenatal, natal, and postnatal care for mothers; infant child care; and community health services through about 250 facilities of various types. Services at the primary level emphasize maternal and child health care.
- PHAM includes religious and other PVOs. It operates hospitals, including rural hospitals, and health centers nationwide. Incorporated into the Ministry of Health's three-tiered system, PHAM provides services to about 1.3 million patients annually and operates 150 facilities with approximately 5,000 beds. PHAM is beset with financial difficulties.
- The Ministry of Local Government operates more than 100 health units with about 660 beds (mostly maternity). Its facilities are weak financially and ill-equipped compared with those of the two agencies discussed above.
- Other health care providers include the army, police, city governments, and a small number of private practitioners. Those providers operate about 200 facilities with approximately 600 beds.

Constraints on the Delivery of Health Care

Several factors constrain the delivery of effective health care services, including lack of policy priority for primary care, inadequate personnel, weak management, high fertility, epidemic diseases, and illiteracy.

Health policy. Although policy priorities focus on primary health care, Malawi consistently allocates most of its health expenditures to curative care (UNICEF 1991). During the 1980s, the Malawi Government never allocated more than 7 percent of its health recurrent budget to preventive services. Because so many resources have flowed to the central and district hospitals, three-fourths of permanent service-delivery staff are found in these facilities. A vicious circle has resulted. Because of the lack of preventive services, the demand for curative care is growing. Curative services, therefore, absorb increasing amounts of resources, leaving less for preventive services.

Historically, the Malawi Government has assigned a low budgetary priority to social programs, including the health sector. However, recognizing the inadequacy of health care funding in times of increasing health risks, the World Bank and the Malawi Government agreed that expenditures on health should gradually increase to 11 percent of the Government's recurrent budget by 1995 (Government of Malawi undated c).

Health personnel. The shortage of trained personnel is the greatest technical constraint on health care delivery in Malawi. The personnel constraint includes a high dropout rate from training programs, low salaries, poor career opportunities, and high turnover of experienced staff. Development of health staff has lagged behind development of health infrastructure. For example, about 50 health centers built in the past few years are not yet staffed because of the personnel shortage (USAID/Malawi 1991).

Retaining health workers has been difficult because of policies governing remuneration, government career service, and conditions of service. Health workers find it difficult to work in underserved areas because of a lack of facilities and an unreliable logistical and supply system.

Recent studies show that to meet demand for health services—expected to increase by 66 percent over the next 15 years—additional health workers must be recruited, trained, and retained in service. Among the personnel of special importance are health surveillance assistants and supervisory staff, including (HSAs) medical assistants and community health nurses. These and other categories of health service personnel have not been produced because training institutions have been unable to increase capacity and output or upgrade preservice and in-service curricula, staff, and facilities.

Health management. Management limitations include excessive centralization, health workforce shortages, the very large number of donor-funded projects, weak planning and coordination among disease programs and support units, lack of precision about health priorities, and absence of a management

information system. Data on service delivery and performance, such as case management practices, are limited.

The Ministry of Health has regional, district, and peripheral levels. CDIE's study found that improved communication, clarified functional responsibilities between administrative and technical operations, and strengthened coordination, planning, training, and accounting are needed at all three levels. Management of health services at the district and peripheral levels is fragmented and characterized by duplication of services. The integration of A.I.D.-supported activities within the Ministry means that two sets of bureaucratic rules and procedures encumber each project activity.

Logistics. Inadequate transportation and shortages of equipment and basic supplies hamper the delivery of health services.

Fertility and population. The high fertility rate results in great numbers of high-risk births, growing numbers of children exposed to childhood diseases, and pressures on health care facilities and services.

Epidemic diseases. Recent evidence indicates that HIV infection is spreading rapidly, especially among men and women in the 25-45 age group. Malaria infection rates are in excess of 50 percent in Malawian children.

Illiteracy. The low level of female educational attainment results in high illiteracy among mothers and reduces the effective utilization of preventive health measures. The CDIE team did not find evidence that child survival programs have given sufficient attention to the current female illiteracy problem as it affects adoption and use of effective health practices.

Drought. The CDIE team was in Malawi during the second year of what some authorities expect will be a 7-year drought. Drought will have a severe impact on the already critical malnutrition problem and will further complicate Malawi's efforts to reduce infant and child mortality.

3. A.I.D.'s APPROACH TO CHILD SURVIVAL IN MALAWI

In 1981, 4 years before initiation of A.I.D.'s child survival program in Malawi, the A.I.D. Bureau for Africa began a 13-nation program targeting improved health for children and infants. The program emphasized immunization coverage and the control of diarrheal diseases and malaria.

In Malawi during the early 1980s, A.I.D. provided staff training and infrastructure support to the Ministry of Health through bilateral health projects totaling \$16 million. Among Agency health projects also initiated during this period were those that funded studies, technical assistance, and supplies enabling the Ministry to better respond to malaria and diarrheal disease.

In 1985, the Bureau for Africa identified eight countries, including Malawi, in which special attention would be given to child survival. The A.I.D. Mission in each of those nations was responsible for developing child survival objectives consistent with the bureau's child survival action plan, which emphasized interventions that address very high fertility and closely spaced births, prevalence of major diseases (including AIDS and malaria), malnutrition, and inadequate personnel to develop and maintain a health care delivery system.

USAID/Malawi's Child Survival Program

There are several noteworthy characteristics of A.I.D.'s child survival program in Malawi. First, the program is relatively recent, with the earliest activities beginning in 1980. Most of the current activities were initiated in 1989-1990. Second, the project portfolio is diverse. There were more than 20 discrete activities under way at the time of the CDIE field study. These activities include large bilateral projects, centrally funded PVO projects, and buy-ins for specific technical assistance or procurement activities. The most important distinguishing feature of the Malawi portfolio, compared with other A.I.D. country child survival programs, is its emphasis on institutional development. A.I.D. has chosen not to become heavily involved in directly supporting health services to

mothers and children because of ample other-donor support for those more traditional child survival interventions.

In the 1980-1985 period, before the Agency's program got under way, three successful A.I.D. bilateral projects (totaling almost \$16 million) related to child survival were undertaken: Self-Help Rural Water Supply, the Rural Development Linkages Program, and Health Institutions Development. The major thrust of these projects was capacity building to support primary health care services. The first two projects targeted rural areas and the problems of the people living there, with emphasis on infrastructure and facilities and the training of government specialists. The third project also developed infrastructure and provided training, with the focus on the Ministry of Health.

There were other A.I.D. projects, centrally and regionally managed, beginning before 1985, that provided child survival benefits to Malawi. One was the Cornell Nutrition Surveillance project, which produced an analysis of nutritional problems in Malawi. Also, beginning in 1980, the American Schools and Hospitals Abroad (ASHA) Program initiated grant aid—eventually to reach \$3 million—to Malamulo Hospital to expand its curative and preventive health services and teaching programs.

In the 1985-1986 period, the centrally managed Combating Childhood Communicable Diseases (CCCD) project began a 4-year, \$4 million component in Malawi. The CCCD subproject supplied technical assistance, training, and supplies to enable the Ministry of Health to develop services for malaria and control of diarrheal diseases. Because of the CCCD project, oral rehydration therapy (ORT) became accepted and available in fixed facilities throughout the country. Much of the CCCD program was continued later under the bilateral Promoting Health Interventions for Child Survival (PHICS) project.

In 1987 and 1988, A.I.D. addressed child survival objectives through centrally managed projects, including the CCCD and the Health Communications (HEALTHCOM) projects (diarrheal diseases); Cornell Nutrition Surveillance (nutrition and dietary surveys); Adventist Development Relief Agency (ORT, immunization, and nutrition); International Eye Foundation (ORT, immunization, and vitamin A); Save the Children (ORT, immunization, and nutrition education); Family Planning International Assistance (child spacing); SOMARC (Health/Contraceptive Social Marketing); and John Snow International/Centers for Disease Control (CDC) (child spacing commodities and logistics).

Projects designed from 1989 through 1991 are listed in Table 1. A.I.D. grant assistance to Malawi's health sector currently totals \$44 million over the planned life of more than 20 projects ongoing as of 1990. Those projects fall into five categories:

Table 1. A.I.D. Support to Health and Population

Project	Duration	(\$000)
<u>Integrated and Multisectoral Projects:</u>		
Promoting Health Interventions for Child Survival (PHICS)	1989-1997	26,700
Human Resources and Institutional Development	1987-1995	1,300
Services for Health, Agriculture, and Rural Enterprise Development (SHARED)	1990-2000	3,750
<u>PVO/NGO Child Survival Projects:</u>		
Save the Children Federation	1989-1992	600
International Eye Foundation	1989-1992	1,330
Adventist Development and Relief	1990-1993	550
World Vision Relief and Development	1990-1993	475
Project HOPE Child Survival	1990-1992	575
<u>Population and Family Planning Projects:</u>		
Child Spacing Commodities	Annual	450
Demographic and Health Survey (DHS)	1991-1992	445
Association for Voluntary Surgical Contraception (AVSC)	1990-1992	150
Family Planning Services Expansion and Technical Support Project (SEATS)	1990-1994	500
Health Social Marketing Project (SOMARC)	1990-1993	662
Resources for Awareness of Population Impacts on Development (RAPID)	1989-1991	100
<u>AIDS Prevention Projects:</u>		
AIDS Communication Support	1989-1992	800
AIDS Technical Support	1990-1992	200
Project HOPE AIDS	1990-1993	722
Condoms for AIDS/STD Prevention	Annual	483
WHO/Global Program on AIDS	Annual	400
<u>Other Health Activities:</u>		
A.I.D. Support to UNICEF for EPI	1991	500
American Schools and Hospitals Abroad (ASHA) Grants to Melamulo Hospital	1980-1990	3,000
Phalombe Disaster Assistance	1991	340
Total		44,032

(Source: USAID/Malawi)

- Integrated and multisectoral projects, representing 72 percent of the \$44 million child survival budget, include promotion of interventions for child survival.
- PVOs/nongovernmental organization (NGO) child survival projects constitute 8 percent of the \$44 million budget.
- Population and family planning projects comprise 5 percent of the budget.
- AIDS prevention projects, representing 6 percent of the budget, include technical support and condom distribution.
- Other health activities, the last of which terminated in 1991, included hospital grants and disaster relief. These activities accounted for 9 percent of the budget.

USAID/Malawi's Evolving Child Survival Strategy

If there is an A.I.D. child survival strategy in Malawi, it is one that has evolved in response to the country's needs and to external influences. This has given the Mission portfolio what is often referred to as a look of scatteration. In other words, USAID/Malawi did not design a unified strategy 6 or 7 years ago, specifying what A.I.D. would do, how it would do it, and how long it would take. Instead, during the program's formative years, A.I.D. was gradually analyzing different aspects of the health sector in Malawi and pulling together existing bilateral and centrally funded programs to create a child survival "package."

Over the past 5 or 6 years, A.I.D. used resources from the "cafeteria" of available central projects while attempting to assert greater control over its child survival portfolio. This is never easy because of what A.I.D. field Missions face when special causes like child survival are declared: proliferating A.I.D./Washington projects responding to Congressional earmarks, internal directives, and the pressures of special interest groups, American and international. Elements of some of these programs, managed and directed from outside, are sometimes targeted to the host country with little or no participation by the local A.I.D. field Mission.

In recent years, A.I.D.'s field Mission staff have started to assert greater conceptual coherence in and programmatic control over the A.I.D. child survival activities in Malawi through the following:

- The A.I.D. Mission commissioned analyses and evaluations, including special studies of malaria, AIDS, health care staffing, child spacing, and the role of women in development. The Mission also availed itself of the latest information generated by the Malawi Government and the bilateral and multilateral members of the donor community to use in program planning and design. It used that information to build strong arguments for the commitment of Agency resources to health problems in Malawi.
- A.I.D. participates in donor coordination meetings, a critical step because of the large number of activities sponsored by external agencies in the health sector. The donors have organized sectoral committees to share information, eliminate duplication, and develop a consensus on major program and policy issues.
- USAID/Malawi has integrated child survival with broader health and population concerns.

The evolving child survival, health, and population (CS-HP) strategy of USAID/Malawi has three main elements. The first element is the Mission's emphasis on preventive health measures. To reduce disease and the consequent demand for costly curative services, the Mission supports policies and programs emphasizing health promotion and disease prevention. An analysis of the Mission's health program portfolio shows a consistent long-term commitment to encouraging the Ministry of Health to redress the imbalance between curative and preventive health activities.

The second principal strategic component is a strong focus on sustainability. The strategy has a long-term objective of making Malawian health care self-sufficient after A.I.D. involvement ends. That includes self-sufficiency in terms of finances, management, and capacity to survive constraints and other aspects of the external environment. For example, the project accounting for most child survival funding, the PHICS project, focuses principally on health-sector institution building and health-care worker training.

The third main element of A.I.D.'s country strategy in Malawi is direct support for selected health services of a critical or urgent nature. Such services include control of malaria, high fertility, and AIDS, as well as provision of water and sanitation facilities.

4. EFFECTIVENESS

As noted earlier, the child survival program in Malawi is fully integrated with overall health and population strategy. Thus, this review of program effectiveness focuses on the entire health portfolio of USAID/Malawi; first on service delivery; and then on capacity building. Figure 1 illustrates how the concept of effectiveness is related to the different components of the program.

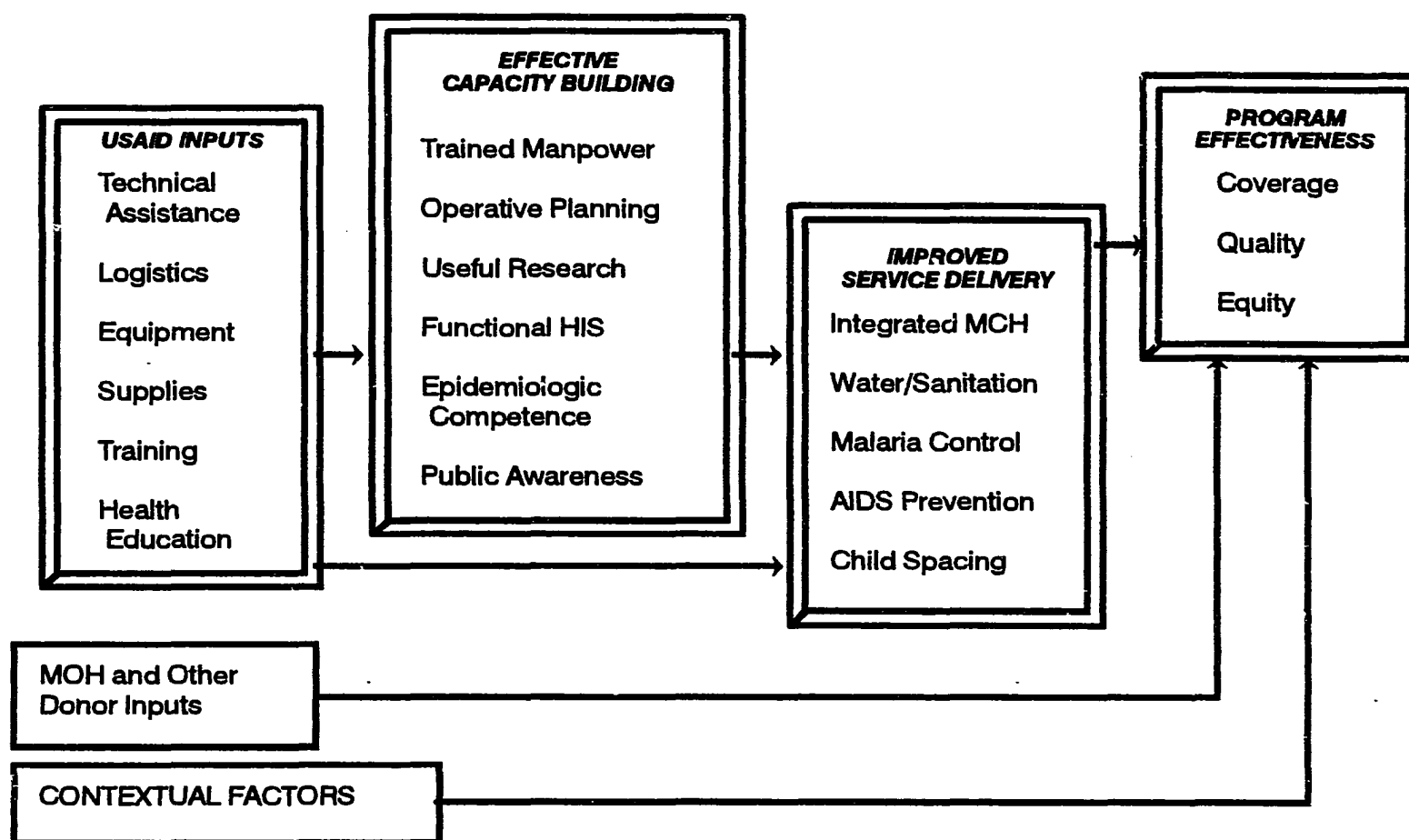
Effectiveness of Service Delivery Interventions

The CDIE team posed three questions to the assessment of effectiveness of service delivery: To what extent is each service reaching targeted beneficiaries? Is service delivery equitable? Is the service of high quality? The assessment of service delivery focuses on water supply, health education, and sanitation promotion; malaria control; HIV/AIDS control; child spacing; integrated maternal and child health services; immunization; and diarrheal disease control.

Water Supply, Health Education, and Sanitation Promotion

Hygiene education and sanitation promotion are integral to USAID/Malawi's water supply activities, which provide potable water through the construction of gravity-fed piped water systems in rural areas. Program effectiveness can be measured in terms of the number of people with access to rural piped water. Between 1980 and 1988, A.I.D. supported construction of 18 piped water schemes, which reached 421,000 people in more than 1,400 villages. Nationwide, about 25 percent of the rural population lives in areas suitable for piped water schemes, and about 19 percent of the population now has such access.

Figure 1. Conceptual Model for Program Effectiveness Malawi



Note: MOH = Ministry of Health, HIS = health information system; MCH = maternal/child health
Source: CDIE Evaluation Team

Regarding sanitation and hygiene practices, three facilities were provided at each water point: aprons, washing slabs, and latrines. In the 13 geographic areas affected by this project (7 supported by A.I.D.), 64 percent of families had latrines, compared with 35 percent prior to the project. According to an evaluation report, the project reached 270,000 persons by 1986, well over the 202,000 originally targeted (Warner et al. 1986).

Based on international studies and limited analysis in Malawi, a coordinated program for improving water supply, excreta disposal, and food hygiene has the greatest potential for measurable success in reducing the incidence of diarrhea (Warner et al. 1986). Capitalizing on that potential, the PHICS project is designed to promote water supply, hygiene, and sanitation as a package. Fourteen new schemes are to be constructed and will serve a population of 245,000 living in 800 villages.

Malaria Control

Since 1984, A.I.D. has been the primary donor to the Malawi malaria control program, including a national effort in 1985-1989 that emphasized the use of chloroquine for malaria treatment and prophylaxis. A 1986 external evaluation confirmed that chloroquine was available in all health facilities. During field visits, the CDIE team found that chloroquine was one of the few drugs consistently available, often in abundance.

The 1987 CCCD project's annual report stated that all hospitals and facilities sampled were following the national guidelines for malaria treatment and prophylaxis. A comprehensive program review in 1989 determined that patient assessment was correct in all observed cases and that the signs and symptoms of malaria were well conceived.

Despite the program's success, the incidence of malaria is increasing with the recent spread of chloroquine-resistant strains. Fansidar is now being tried by the program as a new drug of choice for malaria. Chloroquine underdosing probably was a common practice and contributed to the spread of resistance.

The Ministry of Health and USAID/Malawi recognize that monitoring drug availability will be critical to successful implementation of the new policy for Fansidar. At the facility level, plans are being made to monitor case management practices. Making this type of data collection a systematic part of the program will facilitate future assessment of program effectiveness.

Malaria control strategies other than chemotherapy and prophylaxis are not being widely implemented. UNICEF and A.I.D.-supported PVOs are introducing insecticide-impregnated bed nets into their area-based child survival project.

The CDIE evaluation team noted a certain complacency about malaria, although it is the primary cause of outpatient visits, hospital admissions, and hospital deaths in nearly all age groups nationwide. An important part of introducing Fansidar will be to revitalize health worker motivation and sense of control in the battle against malaria.

HIV/AIDS Control

The rapidly spreading HIV has infected an estimated 10 percent of the Malawian population. A severe epidemic is expected to take a serious toll on child survival rates. To support Malawi's National AIDS Control Program (NACP), A.I.D. provides technical support, in-service training for health workers, AIDS education in the schools and for religious communities, monitoring and surveillance activities, and condoms. A.I.D. is also designing a large, new bilateral project with HIV/AIDS control as one of its major interventions.

Three questions pertain to the effectiveness of NACP: Has the population's awareness of AIDS increased? Has condom use increased? Has sexual behavior changed? There is evidence that NACP has been effective at generating a widespread increase in AIDS awareness. But some questions remain about whether the message is reaching the highest risk groups. Condom distribution increased dramatically in recent years for AIDS prevention and child spacing. From 1990 to 1991, the number of A.I.D.-supplied condoms increased to 3.7 million from 200,000 per year (Atkinson undated). However, the success in distributing donated condoms has hindered the A.I.D.-supported social marketing effort to sell them. Since its launch in August 1991, the social marketing effort has sold 200,000 condoms, approximately 20 percent of projected targets.

Evidence on actual condom use is scarce. The 1991 SOMARC survey, which looked at urban populations and addressed condoms in terms of contraception, showed an increase in current condom use from zero in 1984 to about 10 percent at the time of the survey. Beyond that finding, no data have yet been collected on behavior change resulting from increasing AIDS knowledge and awareness. USAID/Malawi is working with international experts to develop a feasible monitoring approach to measure such changes.

Child Spacing

Malawi embraced child spacing as a health care intervention in 1984. USAID/Malawi is a major donor for child-spacing activities, supporting contraceptive supply, computer modeling, policy dialogue, voluntary surgical contraception, and operations research in community-based contraceptive distribution. In terms of program effectiveness, data are available to review progress in health worker training, the number of facilities providing child-spacing services, and contraceptive distribution. Data on contraceptive prevalence are limited.

A.I.D. support helped train more than 900 health workers as child-spacing service providers, although only about 500 are currently providing that service. Of Malawi's 748 health facilities, 210 offered child-spacing services in 1991, in contrast to 1 in 1984 (USAID/Malawi undated). Contraceptive prevalence increased from 1 percent in 1984, according to a Family Formation Survey, to as high as 10 percent in urban areas in 1991, according to a SOMARC survey. With USAID/Malawi support, voluntary surgical contraception increased from zero in 1984 to 1,200 in 1991.

Despite early signs of child-spacing progress, the rigor and duration of training for providers constrain effective service delivery. Also, certain practices and procedures of service provision appear to hamper child-spacing acceptance. However, recent indications suggest training simplification may occur as well as the elimination of certain service provision procedures.

Regarding demand for child-spacing services, surveys indicate that women desire fewer children than the current national average. Recently, the population policy climate has warmed notably. The Life President and Parliament approved a National Welfare Council to coordinate all child-spacing activities.

Integrated Maternal and Child Health Services

USAID/Malawi supports the goal of improved, institutionalized integrated health services. Recently, the Ministry of Health changed from a strategy of holding different clinics on different days to one of providing the full spectrum of services on a daily basis. Those "integrated clinics" offer immunization, oral rehydration therapy (ORT), outpatient treatment of minor childhood illnesses, growth monitoring, and child spacing where trained providers are available.

In the absence of 1991 data on service delivery, assessing the implementation or performance of those clinics is difficult. The CDIE team

observed integrated clinics, and a major advantage appeared to be comprehensive handling of mother and child. For example, vaccinations were given to children who had been brought in because of other illnesses. However, these clinics suffer from a high patient load relative to available staff, drugs, and supplies. As a result, quality suffers; visits to the clinics often involve extended waiting times, unavailable treatments, and insufficient time for health care workers to spend with patients.

The primary objective of the service delivery component of USAID/Malawi's PHICS project is to demonstrate replicable ways of delivering child survival services at the community level. At the time of the evaluation, the demonstration activities had not begun. A baseline survey was conducted in October 1991, but the data have not yet been analyzed because of administrative complications between USAID/Malawi and the Ministry of Health.

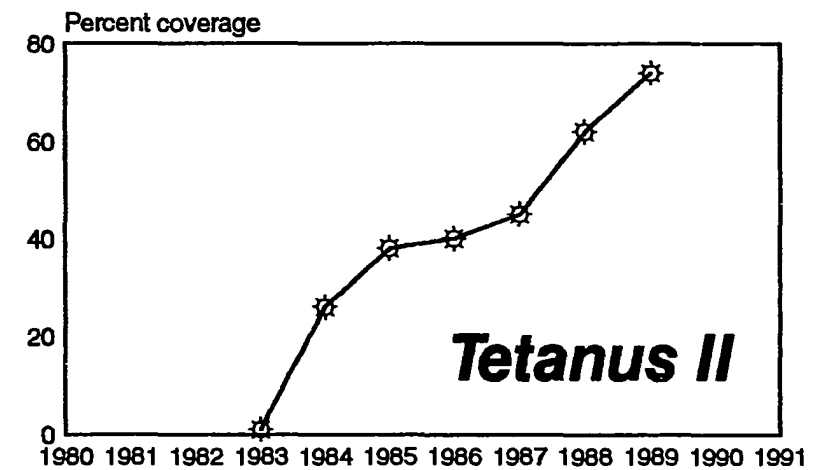
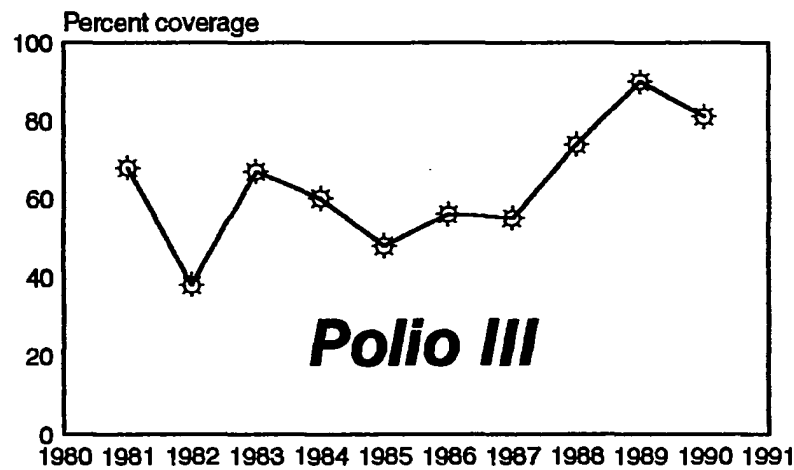
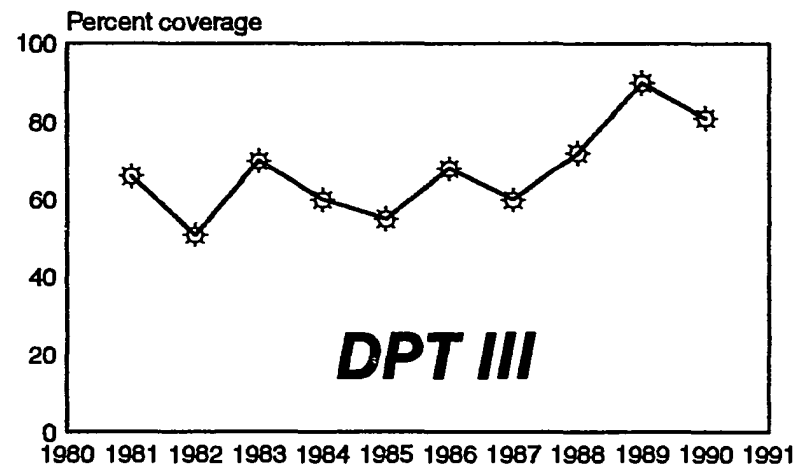
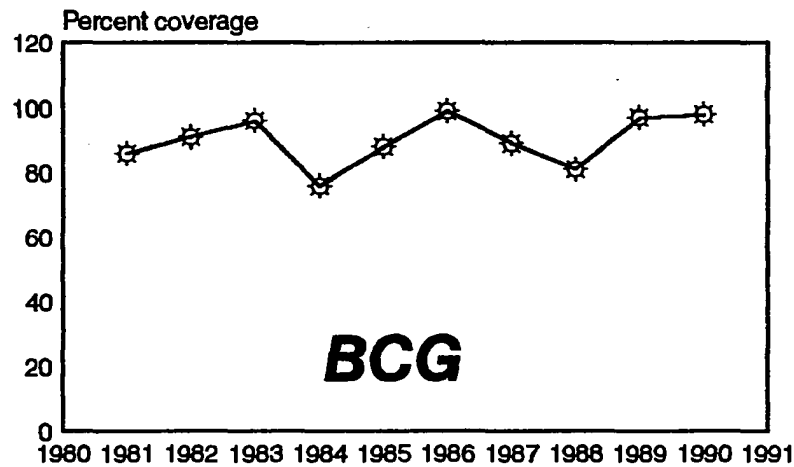
Also, five A.I.D.-supported PVOs are trying new approaches to delivering integrated maternal and child care services in different regions. One PVO is working with private tea estates to improve health services for employees and dependents. Another has led the way in introducing vitamin A as a basic preventive health intervention. All are experimenting with different training approaches, job descriptions, and motivational strategies for village health workers.

Immunization

Malawi's strong immunization program had coverage rates reaching about 80 percent in 1990. UNICEF is the lead donor for immunizations and A.I.D. does not normally provide direct support for the operational expenses of this program. In 1992, however, UNICEF faced funding problems and A.I.D. made a grant to UNICEF covering about one-third of Malawi's annual budget for immunizations. Without that support, national coverage could have dropped to 60 percent or lower. USAID/Malawi was not aware of the grant to UNICEF in time to establish mechanisms for monitoring activities supported by the grant. USAID/Washington needs to coordinate with all Missions involved whenever such situations arise.

Immunization is an ongoing challenge with a new cohort of infants to be immunized every year. Despite the strength of the Malawi program, the funding base is not stable and concerns of sustainability must be addressed. If not, the potential exists for drops in coverage and resurgence of disease should future funding shortfalls occur. Figure 2 shows historical trends in immunization coverage in Malawi.

Figure 2. Immunization Coverage Rates



Source: Center for International Health, International Science and Technology Institute, June 1991

Control of Diarrheal Diseases

Dehydrating diarrhea is a major cause of childhood morbidity and mortality in Malawi. Reports from the Control of Diarrheal Diseases (CDD)/Malaria sentinel surveillance system indicate that home practices have not improved and may have even declined since 1986.

The CDD program suffers from many constraints. Its management is handled by the technical branch of the Ministry of Health rather than by the Family Health Services Unit. A single program manager is responsible for both the malaria control and diarrheal disease control programs, two major disease areas. In addition, the Government's policies on diarrheal disease control are not entirely clear. Finally, the quality of care provided by oral rehydration units around the country appears to be problematic.

UNICEF is the primary donor to the CDD program and has expressed concern that its level of support may be inadequate. Thus, A.I.D. and other donors should reevaluate their commitment to this effort. A major health education initiative may be in order.

An alternative strategy worthy of consideration and possible A.I.D. support is integrating ORT more centrally into case management of the "sick child." Because of clinical overlap among diarrhea, malaria, and acute respiratory infections, case management based on broad clinical assessment rather than on disease categorization would permit greater program effectiveness and impact. A comprehensive approach to case management would fit in well with Malawi's integrated service delivery system and could be introduced as part of the retraining efforts that will be undertaken for the introduction of Fansidar.

Effectiveness of Capacity-Building Efforts

To what extent is A.I.D. developing Malawian capacities for the sustained delivery of health care services? To answer that question in terms of "capacity built" is premature for a program as young as Malawi's. Therefore, the CDIE team's findings are only a preliminary assessment of A.I.D.-supported capacity-building efforts in the Ministry of Health, including training, planning, information, and communication.

Training of Health Surveillance Assistants and Paramedics

As the primary contact between the health care system and the community, health surveillance assistants (HSAs) have broad responsibilities for preventive and basic health care services and the collection of health information. The objective of A.I.D.-supported training is to raise the number of trained HSAs to 4,000 from today's 500. Despite delays, the HSA training coordination function has been established within the Ministry of Health. Twenty district health personnel have been trained as HSA trainers.

During early 1992, the first round of PHICS-supported HSA training was conducted for 170 HSAs around the country. Although reports concerning the quality of the 6-week training program have been generally positive, the prevailing opinion was that knowledge of all job components could not be absorbed within the time allotted. Thus, the success of HSAs still depends to some extent on the practical and interpersonal skills HSAs acquire through experience.

Currently, several issues regarding the training program are under review, including the HSA job description, the training approach for village health volunteers (VHV), and the working relationships and division of responsibilities between VHVs and HSAs.

Five A.I.D.-supported PVOs are also working with HSAs and VHVs. Different training and supervision strategies are being tried.

A.I.D. also supports in-service paramedical training in primary health care, child spacing, and HIV/AIDS. Of the 2,500 health workers in Malawi, more than 900 have been trained in child-spacing, 800 in HIV/AIDS control.

The Ministry of Health and USAID/Malawi recognize the need for a longer term, more comprehensive solution to the problem of low-intake capacities and of fragmented and uncoordinated training. Thus, the Mission is supporting establishment of a Manpower Development Unit in the Ministry.

Planning

To strengthen the Ministry of Health's planning capabilities, A.I.D. is supporting the establishment within the Ministry of a Manpower Development Unit whose primary objective is to prepare a comprehensive personnel development plan. The plan will include enhancement of career opportunities and organization of training programs. At the time of CDIE's evaluation, the

Ministry had formally established the unit, which has hired staff and initiated training activities and data collection.

Each health unit receiving PHICS funds must prepare an annual workplan outlining and scheduling major activities. Ultimately, USAID/Malawi reviews workplans (consolidated as project workplans) and negotiates controversial items with the Ministry of Health until a consensus results. Among the advantages of workplans is that they serve as contracts by which all parties understand what has been agreed to.

With one exception, all unit staff interviewed by the CDIE team viewed workplan development favorably. The exception was a program manager who noted the burden of developing separate workplans for each donor. In contrast, another unit's workplan incorporated the requirements of all donors. Donors and unit managers must develop the most effective and efficient planning tools so that planning does not overwhelm program implementation.

Information

A.I.D.'s information-related assistance to the Ministry of Health centers on research, epidemiology, and health data. CDIE's evaluation limited itself to A.I.D.-assisted research activities. USAID/Malawi's support for such activities as the following promotes the institutionalization of a Malawian research infrastructure:

- *The Ministry's Research Unit.* The Research Unit's objective is to technically and financially support policy- and action-oriented research. Following training, three local five-member teams of investigators submitted good quality, relevant research proposals to the unit. The three proposals focused on child spacing, village health committees, and nutrition. Under development is a computerized system for tracking and cataloging research. The Research Unit seems to be off to a very strong start.
- *Malaria research.* A.I.D. has funded assistance from the CDC for numerous operational research activities, especially in malaria control. A major outcome of that research is the change from chloroquine to Fansidar as the first-line drug for malaria.
- *Proposed field research station.* An amendment to the PHICS project calls for a field research station to address critical health issues of local importance. Already established in that regard is a strong

foundation of field teams and staff for data collection and data entry. Important to the effectiveness of the field station will be the quality of the relationship between it and the Ministry of Health Research Unit.

Communication

USAID/Malawi supports production of a variety of child-survival-related health education materials and messages in response to requests from the Ministry of Health and other government agencies. In early 1992, recruitment of 31 additional health educators was under way.

5. EFFICIENCY

In a world of scarce resources, evaluation of the economic benefits of USAID/Malawi's large commitment to child survival is important. The ultimate economic benefit of child survival activities is economic growth resulting from decreased child mortality and morbidity.

The analysis of the economic efficiency of USAID/Malawi's child survival program is composed of two components: (1) a quantitative determination of the minimum economic benefits required to cover program costs and (2) a qualitative assessment of the program's economic efficiency.

Quantitative Analysis: Benefits and Costs

The quantitative analysis examines whether the child survival program is a worthwhile investment for Malawi; that is, whether program results warrant the amount of resources expended.

Conceptual Framework of the Analysis

Success of USAID/Malawi's child survival program in terms of decreased child mortality and morbidity can lead to various benefits: decreased health care expenditures, increased labor supply and productivity, decreased school absenteeism, higher returns on education, and increased savings rate and capital formation. Those intermediate benefits can contribute to economic growth, which, in turn, could generate increases in health status if yet additional resources were devoted to health interventions. (For a detailed literature review of the empirical evidence of those effects and linkages, see Schwartz and Bender 1992.)

Economic costs of the child survival program must be less than the economic benefits if the program is to be considered worthwhile from an efficiency standpoint. For example, direct costs of the PHICS project that are allocable, at least in part, to child survival include those incurred for personnel

training, institutional capacity building, policy formulation, research, data collection and analysis, and computer and software purchases.

Approach and Results of the Quantitative Analysis

The quantitative approach is based on traditional cost-benefit analysis. Costs are USAID/Malawi's investment in child survival activities. Enhancement of human capital represents the benefits; that is, the positive change in a representative individual's expected lifetime economic earnings and productivity resulting from the child survival program. Dividing costs by the human-capital figure yields an estimate of the number of children that must be saved to justify the program in economic terms. That number is compared with the number of children likely to be saved by the program; if the latter number at least equals the former, one may conclude that the program is economically justified. Details and results of the foregoing analytical approach follow.

Step 1. Determined first is a measure of the direct costs of child survival interventions; namely, the present value of USAID/Malawi's investment in child survival activities for the period 1992-2000. The USAID/Malawi budget submission and related project activity codes for fiscal year 1992 yielded an estimate of (1) the percentage of funding for each project in the Mission's health and population portfolio directed toward child survival activities and (2) the annual funding for each child survival project during the 1992-2000 period. Discounting of the projected stream of child survival investments resulted in an estimate of the present value of the child survival program.

The CDIE team made three assumptions about the percentage of the Mission's health and population funding allocated to child survival activities: the base assumption, which is the team's best estimate, allocates the smallest percentage to child survival projects; the full assumption allocates 100 percent of health and population funding to child survival; and the medium assumption generally allocates a percentage that falls between the other two.

The team made the last two assumptions to determine how sensitive the results of the analysis would be to higher allocation percentages.

Results. Depending on the discount rate used (10, 12, or 14 percent), the present value of the child survival program ranges from about \$16 million to \$19 million under the base assumption and from \$55 million to \$66 million under the full assumption. Under the base assumption, that means that economic benefits of the program should reach at least \$1.74 million annually for 20 years to achieve a 10 percent rate of return. Otherwise, program funds should be invested in alternative activities.

Step 2. Determined during this step of the analysis is the economic benefit of reduced child mortality resulting from the child survival program. The analysis focuses on the benefit of saving a life through age 5. As noted earlier, the human-capital approach is used, whereby the benefit of the program is expressed as its impact on the lifetime earnings and productivity of an average person in Malawi.

In predicting lifetime income, the analysis relies on underlying shadow (real) prices and costs, not nominal prices. Market imperfections often cause nominal prices to be out of line with shadow prices, which indicate the real cost to the economy for using resources. As a result, the analysis adjusted estimates of average annual income downward by 20 percent and decreased wage rates by 50 percent. Those relatively large downward adjustments will result in a conservative estimate of the benefits of the program.

Results. The estimated present value of the lifetime income stream of a randomly selected child at various discount rates (10, 12, and 14 percent) ranges from about \$600 to \$950 (1992 dollars).

Step 3. This step calculates the number of children who must be saved annually for 20 years by the child survival program for it to be justified economically.

Results. Based on the findings of steps 1 and 2 and under the base assumption, if the program saves 1,827 to 4,119 children annually for the next 20 years, it is justified in terms of economic efficiency. Under the full assumption, the entire health and population portfolio is justified if it saves about 6,300 to 14,300 children in each of the next 20 years.

Step 4. This final step addresses the question of whether the child survival program is likely to save the number of children noted in step 3.

Results. Under the base assumption, the required number of children to be saved (step 3) represents a relatively modest decrease in deaths of children under age 5 during 1992—a decrease ranging from 1.56 to 3.52 percent annually. Even under the full assumption, the decrease does not appear unrealistically large—in the range of 5 to 13 percent.

Conclusion. Overall, results suggest that the improvement in the child mortality rate that the child survival program needs to make to justify the program on economic efficiency grounds is not unreasonable, especially in view of the conservative approach of this analysis.

Qualitative Assessment of Economic Efficiency

Certain efficiency issues in the Malawi health sector that the child survival program deals with cannot be quantified but must be addressed through a qualitative assessment.

Economic Rationale of the Child Survival Program

Consumers' willingness to pay for health care depends largely on who receives the benefit. Willingness to pay a doctor to set a broken arm is high. Willingness to pay directly for preventive health measures, such as spraying for malaria control, is relatively low; that sets the stage for their provision by government, a process in Malawi that the child survival program renders more efficient through its emphasis on primary health care.

The problem with trying to quantify the cost-effectiveness of the program is that none of the A.I.D. projects or their components is a delivery system for health services. Instead, the program complements, supports, and assists ongoing health care services in Malawi and, by so doing, increases the effectiveness and efficiency of those services.

Allocation of Program Funds

Budget data reveal that the majority of USAID/Malawi funding complements primary health care services through institutional capacity building, not direct service delivery. The relatively large training component, in particular, serves to increase the efficiency of the health sector.

Health Sector Efficiency

The Malawian health sector can achieve efficiency gains in personnel development, decongestion of central hospitals, and cost recovery as follows:

- ***Personnel development.*** Malawi is near the limit of health sector productivity given current personnel levels, particularly with the increasing AIDS burden. Operational efficiency gains seem likely in large hospitals but not at primary health centers until additional personnel are allocated there. With A.I.D. assistance, the Ministry of Health has started to develop and manage its staff more systematically.

In addition, a central element of the A.I.D. Child Survival Program is the training of health personnel, especially for rural areas.

- *Decongestion of rural hospitals.* Congestion at the main hospital appears to stem from a lack of accessible or acceptable peripheral facilities providing good quality care from well-trained staff with adequate drugs and diagnostic capabilities. To deal with the problem, the Malawi Government has acted to decentralize health services and to increase the quality of outreach work and the number of peripheral facilities. The child survival program directly supports the decentralization effort through its training program for primary health providers in rural areas.
- *Cost recovery.* Until recently the Malawi Government has been reluctant to consider fee-for-service schemes within the Ministry of Health. In terms of economic efficiency, fee-for-service should apply to curative health care services, especially at the main hospitals, where a fee system would encourage patients to seek care at appropriate levels of the health care system. USAID/Malawi could assist by conducting studies on the willingness to pay for health care, cross-subsidization of preventive services through curative service charges, pooled risk-sharing schemes, general health care financing studies, and the role of the private sector.

6. SUSTAINABILITY

Along with effectiveness and efficiency, sustainability is an aspect of the CDIE team's assessment of the performance of the A.I.D. Child Survival Program and its various projects. This section addresses institutional and financial sustainability.

Institutional sustainability is the cornerstone of USAID/Malawi's child survival program. CDIE defines achievement of institutional sustainability as "the continuation of health benefits and activities at least 3 years after U.S. project funding terminated" (A.I.D. 1990). USAID/Malawi's interventions promote institutional sustainability by increasing the capacity of health-sector organizations to manage operations independently and effectively and to make strategic decisions and solve problems.

To evaluate the sustainability of A.I.D.-supported activities and institutions, the evaluation team developed a set of indicators that were then incorporated into standardized checklists. The checklists were used in interviews and in observation visits to project sites. They were applied to selected projects completed before 1989. An activity was considered sustained if it continued in 1992 in a manner compatible with the original activity with support from the Malawi Government, communities, private sector, or other donors. Activities that have been continued by A.I.D. alone were not considered sustained. Achievements were considered sustained if the majority of the benefits achieved during the project were evident in 1992. For example, if most, but not all, of the personnel trained under the project continued to work in positions compatible with their training, this achievement was considered sustained. The methodology used to assess sustainability, and the results, are reported in detail in Appendix A.

The team evaluated the institutional sustainability of completed and ongoing projects in terms of the extent to which they exhibited the six key characteristics identified by previous CDIE research (ACSI-CCCD Project and University Research Corporation 1990) as associated with sustainability: the project is perceived as effective, is well integrated into institutional hierarchies, has strong training components, obtains an early commitment of governmental financial resources to continue activities, receives strong community participation, and is characterized by mutually respectful project negotiation.

The projects were also reviewed from the standpoint of certain contextual or environmental factors that previous research found to influence sustainability: political environment, including governmental infrastructure and abilities to develop policy, to plan, and to manage; the general state of the nation's economy; institutional environment, determined by administrative capacity, leadership, and skills; and national commitment to project goals.

Regarding the completed projects only, the CDIE team also looked for indications of institutional sustainability in terms of the following measures: trained personnel (for example, Are they working in the institution that originally implemented the project and occupying positions appropriate to their training?); physical infrastructure, equipment, and vehicles (for instance, Does the infrastructure still exist and is equipment well maintained?); and institutions and financing (for example, Are organizational structures intact and have sufficient resources been allocated to support efforts?).

Also assessed was the financial sustainability of ongoing projects but at the broader program level. The team evaluated USAID/Malawi's efforts to enhance the capacity of ongoing child survival activities to become financially self-sufficient through revenue generation or through other public, private, or donor sources of funding.

Figure 3 summarizes the evaluation team's concept of factors contributing to sustainability.

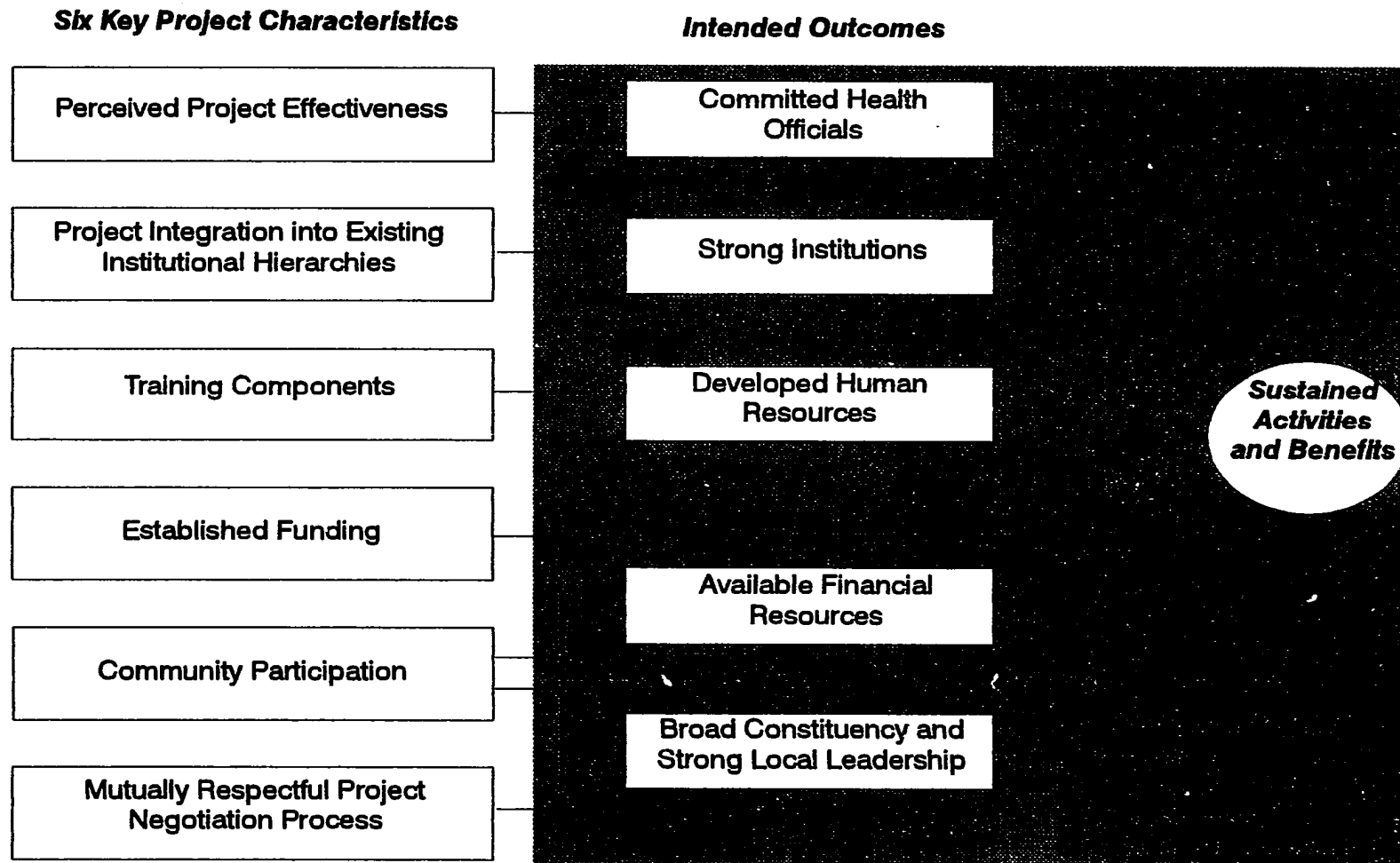
Institutional Sustainability of Projects Completed Before 1989

Two major child survival projects meet the criterion of completion before 1989: Self-Help Rural Water Supply (1980-1988) and CCCD (1984-1988/89).

Sustained Activities and Achievements

The CDIE team found that all activities of both the Self-Help Rural Water Supply and the CCCD projects have been sustained. Activities of the Self-Help Rural Water Supply project include pipeline construction, equipment maintenance, and hygiene education. The CCCD project embraced training of health workers, control of diarrheal disease (CDD), revision of national malaria treatment and prophylaxis policy, and other endeavors. The PHICS project has continued or expanded almost all activities of these projects.

Figure 3. Sustainability Model



Source: A.I.D. 1990 and ACSI-CCCD 1990.

Achievements of both projects have been sustained since termination. A possible contributing factor is that the majority of activities that produced those achievements are continuing under PHICS. Among the achievements of the Self-Help Rural Water Supply project was completion of 18 water schemes, provision of piped water to 420,000 people, and improvement of water quality. The many achievements of CCCD include training more than 3,000 Ministry of Health personnel, developing and implementing a national immunization policy, and ensuring that all health facilities used treatment guidelines for malaria.

Presence of Characteristics Associated With Sustainability

The Self-Help Rural Water Supply and the CCCD projects exhibit the following characteristics and contextual factors associated with sustainability:

- *Perceived effectiveness.* The Malawi Government and Malawian beneficiaries consider both projects as highly effective. The Self-Help Water Supply project continued the successes achieved in prior years and added the highly regarded Hygiene Education and Sanitation Promotion (HESP) component. The CCCD project is praised for its research component and the influence of research results on policy.
- *Integration into institutional hierarchies.* Both projects were integrated into the Malawi Government—the Self-Help Rural Water Supply project within the Ministry of Works and CCCD within the Ministry of Health. The former project successfully promoted collaboration between the Ministry of Works and the Ministry of Health during implementation of HESP. CCCD encouraged cooperation across administrative units in the Ministry of Health to provide integrated services.
- *Training components.* A major component of the Self-Help Rural Water Supply project trained Ministry of Health personnel to instruct health surveillance assistants (HSAs) in hygiene education and sanitation. CCCD focused on the development of training materials and on in-service training for midlevel Ministry of Health personnel who manage information systems or manage and deliver health care services.
- *Committed financial resources.* The Malawi Government made early financial commitments to each project, although how timely those commitments were met is not known. The Self-Help Rural Water Supply project received Malawian resources in the form of local labor

for construction and maintenance of the water schemes. The 1989 evaluation of CCCD indicated that the poor economy limited financial contributions by the Malawi Government and that little financial accountability existed.

- *Respectful project negotiation and community participation.* Malawi Government personnel seemed closely involved in the design and implementation of both projects at the technical level. Unclear, however, is the extent to which project design amendments were truly negotiated and the level of negotiations. In both projects, nonetheless, dialogue between A.I.D., the Malawi Government, and the Malawians appears highly satisfactory. The Self-Help Rural Water Supply project involved local communities in decision-making; CCCD worked closely with policymakers to develop national strategies and plans for the Expanded Program for Immunization, the CCCD project, and malaria control.
- *Contextual factors.* The political environment was favorable and supportive for both projects. Continued recognition is given to the importance of safe water and sanitation and to the important role communities play in that effort. Similarly, the Malawi Government and its citizens were committed to the goals of CCCD. The economic and institutional environments were less encouraging: a struggling economy and severe personnel shortage constrain Malawi's ability to sustain donor-initiated activities.

Potential Sustainability of Current Projects

Ongoing projects assessed for potential sustainability are those whose primary focus is child survival: PHICS (1989-1997) and grants to various PVOs.

Promoting Health Interventions for Child Survival Projects

Continuing many of the activities originated under the Self-Help Rural Water Supply project and CCCD, the PHICS project possesses some of the sustainability features of those completed projects. Implementation of the activities, however, has changed. They are now fully incorporated into the Ministry of Works and the Ministry of Health. PHICS is providing support to the Self-Help Rural Water Supply section of the Ministry of Works and to 10 administrative units within the Ministry of Health.

The CDIE team determined the sustainability potential of PHICS by applying sustainability-related characteristics and contextual factors relevant to ongoing projects. The team used only those characteristics applicable to all project components; that is, to PHICS activities associated with the 11 administrative units of the ministries. Not all units possessing the following characteristics provided information to the team:

- *Perceived effectiveness.* The team used three measures to estimate the potential for perceived effectiveness: development of strategy and objectives by the units, unit use of an annual workplan, and existence of a management information system to monitor and evaluate unit activities. Although all units had annual workplans and most had defined strategies and objectives, only four of eight units providing data to the team had management information systems in place.
- *Integration into institutional hierarchies.* All project activities have been integrated into the Ministry of Health and Ministry of Works, with one exception. A high degree of interaction exists among the PHICS-related units assessed.
- *Training components.* About 88 percent of the eight units supplying information to the team provide training to those either within or outside of the unit. However, lack of coordination and integration of training across units is a serious problem.
- *Respectful project negotiation.* Unit representatives of the seven units assessed stated that they play active roles in project negotiations and decision-making. That is one of the key principles on which the project is founded.
- *Contextual factors.* The most serious constraint facing PHICS is also one of the most important problems it addresses: a severe personnel shortage. The AIDS epidemic threatens efforts to alleviate the shortage. Also, continued low primary and secondary school enrollments will limit the pool of future health care workers.

Private Voluntary Organization Child Survival Grants

Operating within defined geographic regions, the assessed PVO efforts range in duration from 2 to 3 years. The five PVO child survival projects were not designed with sustainability as the primary objective, although that is a growing concern. The key sustainability characteristics and contextual factors

were less relevant to the assessment of PVO grants, so their presence or absence is discussed more generally.

Regarding the characteristic of perceived effectiveness, the ability to demonstrate effectiveness is of primary concern to the PVO projects and is probably the key to their sustainability. Such a demonstration requires sound information systems to document, monitor, and evaluate interventions. All projects have collected baseline information through surveys of their target populations and have established systems for monitoring activities.

As for integration into institutional hierarchies, all PVO projects promote integrated services delivery. All provide services coordinated with those of the Ministry of Health and enjoy supportive collaboration and coordination with one another.

With respect to training components, all projects provide training focused at the village level, especially training to strengthen the link between villages and the health care system of the Ministry of Health.

Regarding community participation, a primary objective of several of the projects is to strengthen the capacity of community leaders to address the health needs of their constituencies.

In terms of the characteristic of respectful project negotiation, opportunities for it at the national level are limited regarding project design and implementation. But all projects appear to promote collaborative working environments, which provide a chance for staff dialogue on day-to-day operations.

As for contextual factors, the short duration of PVO child survival grants severely constrains their capacity to promote sustainable activities and achievements.

Financial Sustainability

The CDIE team focused financial analysis on ongoing projects and assumed that questions about financial sustainability are most critical for continuing projects intended to strengthen institutional capacity and human resources over the long term.

The team applied three criteria to evaluate the potential for financial sustainability of the USAID/Malawi child survival program: assumption of

program costs by the Government, cost recovery, and privatization of child survival services.

Assumption of Program Costs by the Malawi Government

Generally, governments that include in their budgets successively larger proportions of recurrent child survival costs will be more likely to allocate resources to child survival if and when A.I.D. withdraws funding. The Malawi Government has provided written assurance that it will assume the recurrent costs of PHICS according to an agreed upon schedule. Whether the Government will be able to honor that commitment remains to be seen. Many governments have not.

However, if the Malawi Government fulfills its planned increase in the Ministry of Health recurrent budget, the Ministry is likely to have sufficient funds to sustain PHICS if it so chooses. That increase is a condition for a credit received from the World Bank. The credit requires that the Ministry of Health allocate a greater percentage of its budget to peripheral and outreach activities. Because most child survival preventive services probably will be concentrated in peripheral health centers, the Ministry's shift in budget priorities will increase the likelihood of the financial sustainability of child survival services.

In real terms, the Ministry's development budget has been increasing in recent years, while the recurrent budget has remained relatively constant. If the trend continues, this suggests that the recurrent costs required to sustain A.I.D. projects may actually be financed through substitution of other donor funds rather than becoming fully integrated into the Ministry's recurrent child survival budget.

Cost Recovery

Cost-recovery mechanisms, such as fee-for-service charges for private patients, can help to sustain child survival programs financially. Charging fees for curative services could, through cross-subsidization, help to sustain child survival activities, which are primarily preventive measures.

Because such a large majority of the population are subsistence farmers or are unskilled laborers with very low incomes, the potential for raising significant funds from those with an ability to pay for curative services is not expected to be large. But if 3 percent of the total Ministry of Health budget could actually be recovered through a curative-based fee-for-service system, and if that sum were

redirected to preventive child care, that would probably offset all required PHICS recurrent costs.

Privatization of Child Survival Services

An increased private-sector role in the provision of child survival services could reduce public-sector costs related to those services. Governments can help to develop the capacity of traditional birth attendants, village health workers, and other private individuals and organizations to deliver effective child survival services.

USAID/Malawi supports several PVOs through grants for child survival services. In addition, the Ministry of Health provides an annual subsidy to the Private Hospital Association of Malawi (PHAM), whose hospitals account for about one-third of all admissions and for nearly 50 percent of the other health services nationwide.

Nonetheless, little evidence exists that the private sector is a realistic alternative for Government-financed child survival services in Malawi. For instance, several PHAM hospitals have requested the Malawi Government to take over their operations. Privatization, in the sense that child survival services offered by such institutions could be completely self-financed, is not very likely at this time.

7. IMPACT

Impact analysis examines the extent to which A.I.D. health interventions have led to long-term, permanent improvements in child survival in Malawi. Key indicators of impact are infant and child morbidity and mortality rates.

Certain characteristics of the USAID/Malawi child survival program limited the team's efforts to thoroughly assess impact. First, given the relatively short period during which the program has operated, efforts to determine whether it has resulted in long-term improvements are premature, especially with the program's emphasis on capacity building, which requires a relatively long time to generate detectable results. Second, absence of data, inconsistent data, and unrepresentative data blocked the team's efforts to analyze impact. For example, the only source of information at the national level on the causes of child morbidity and mortality is data from health facilities where only about 10 percent of all deaths of children occur, and the representativeness of the 10 percent is questionable. A planned A.I.D.-supported Demographic and Health Survey in 1993 is expected to provide much better information on a range of family health conditions.

Much of the evaluation's quantitative analysis of impact is based on the Health Information System (HIS) maintained by the Ministry of Health. HIS is the only source of information on causes of child morbidity and mortality at the national level, because there is no national vital statistics registration system. Data are available from 1985 through 1990, although they have some serious limitations. Other sources of quantitative data are the 1977 and 1987 population censuses, the 1984 Family Formation Survey, disease surveillance systems for diarrheal diseases and vaccine-preventable diseases maintained by UNICEF and the Ministry of Health, and specific studies carried out by A.I.D. and other institutions. Because of the paucity of reliable quantitative information, the CDIE team employed qualitative methods to address the larger issues concerning attribution and program characteristics leading to impact. Sources of qualitative data include interviews at Ministry of Health headquarters, observation and interviews at Ministry of Health field facilities, interviews with managers and field staff of all five PVO grants, village visits to meet with village health volunteers (VHV) and beneficiaries, and inspection of the Mirala piped water scheme in the Zomba district.

Infant and Child Mortality and Morbidity

The following discussion of the trends and implications of child mortality and morbidity lays the foundation for the CDIE team's investigation of the impact of USAID/Malawi's child survival program.

Mortality. According to the recently released 1987 census estimates, about 16 percent of infants die before their first birthday; more than 25 percent succumb before age 5. Though children constitute about 20 percent of the population, they account for approximately 57 percent of all deaths, according to a 1984 survey (National Statistics Office undated). The Ministry of Health projects as much as a 34-percent increase in AIDS-related child mortality by the year 2002.

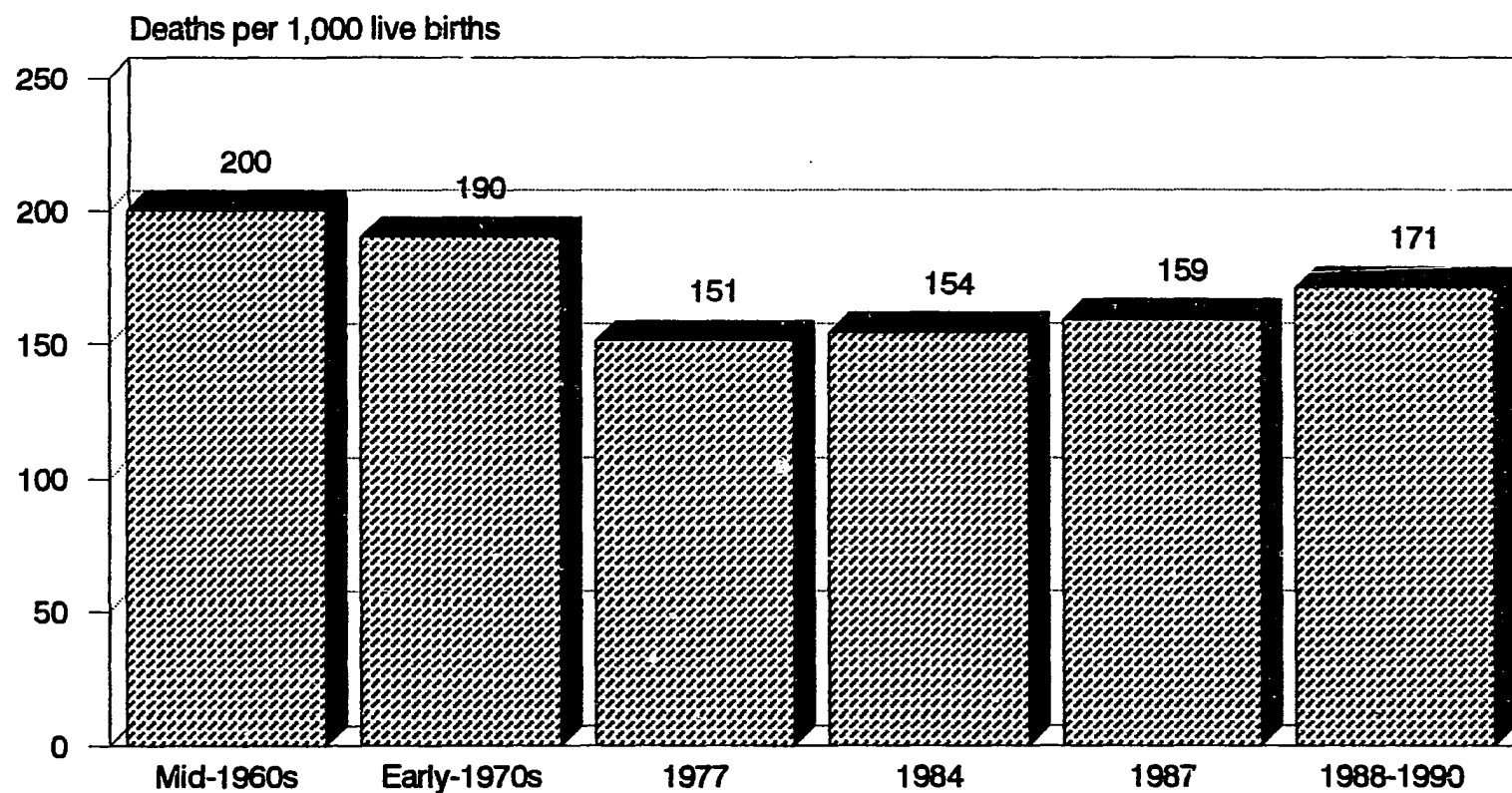
In contrast to many developing countries, infant and child mortality rates in Malawi are declining at a slower rate than in the 1960s and 1970s. Indeed, evidence suggests that the infant mortality rate is increasing because of the resurgence of chloroquine-resistant malaria, accounting for 19 percent of all child deaths in 1990. Highly associated with malaria is anemia, responsible for 13 percent of mortality in children. Figure 4 shows historical trends in infant mortality.

Malaria contributes to mortality by causing (1) acute fever illness that progresses to severe disease and death; (2) chronic debilitation characterized by anemia and malnutrition, which leads to death or contributes to other infectious agents causing death; and (3) placental infection in pregnancy leading to low birthweight, which is the most important risk factor for neonatal mortality.

Avitaminosis causes 17 percent of all child mortality; pneumonia, 13 percent; measles, 11 percent; and diarrheal diseases, 8 percent. The death rate due to pregnancy and childbearing causes is extremely high in Malawi. Estimates of maternal mortality range from 100 to 850 maternal deaths per 100,000 births. One study found that of the full-term infants born alive to mothers who died at childbirth, over 60 percent did not survive to their fifth birthday.

The relationship between socioeconomic factors and infant mortality is nearly universal and Malawi is no exception. Regarding the 1977 and 1987 district-level infant mortality rates in Malawi, higher rates of female literacy and higher population percentages with toilet facilities are highly associated with lower infant mortality; the population increase from 1977 to 1987 is associated with higher infant mortality in 1988. Those three variables together with the 1987 crude birthrate and immunization coverage explain 83 percent of the variation in

Figure 4. Trends in Infant Mortality Rates in Malawi



Source: 1977, Census; 1984, Family Formation Survey; 1987 Census; 1988-1990, Mangochi Malaria Research project.

infant mortality among Malawian districts in 1987. Most of the variation is explained by female literacy and the 1987 crude birthrate. Toilet facilities accounted for very little variation not accounted for by female literacy.

Morbidity. In 1990, malaria and anemia accounted for 41 percent of child hospitalizations, followed by acute respiratory infections (16 percent), diarrheal diseases (9 percent), nutritional deficiencies (9 percent), and measles (9 percent). Malaria is the most frequently seen disease among children treated at outpatient clinics. The morbidity rate from diarrheal diseases showed a 50-percent decline from 1980 to 1989. Although access to ORT rose from an estimated 25 percent in 1985 to 56 percent in 1989, appropriate use of oral rehydration salts occurred in less than an estimated 20 percent of diarrheal cases.

As for nutritional deficiencies, the National Sample Survey of Agriculture for 1980-1981 revealed that about 56 percent of children under 5 in rural Malawi suffered from chronic malnutrition. Protein-energy malnutrition is the primary nutritional problem. Cases of malnutrition in Malawi include lack of food availability at the household level, poor feeding and child-rearing practices, and the effects of disease.

Regarding measles and other vaccine-preventable diseases, immunization now covers most children in Malawi. For example, measles immunization coverage increased to 90 percent of the population in 1990 from 65 percent in 1981 (Center for International Health Information 1991); infection rates among children under 5 halved during the 1985-1989 period.

Like the resurgence of malaria, the advent of the AIDS epidemic diminishes hope for future improvement in child survival rates. In 1990, about 130 cases of AIDS were reported among children under age 5. HIV prevalence among adults was estimated at approximately 10 percent nationally in 1990. As many as 400,000 adults may be infected with HIV, according to USAID/Malawi. By the year 2000, according to Ministry of Health projections, AIDS may orphan several hundred thousand children, which would cause serious consequences for their health and well-being.

The fertility behavior of Malawian women places them and their children at increased risk of morbidity and mortality. Worldwide research demonstrates that closely spaced births, births to very young and very old mothers, and high-parity births increase risks for mothers and children. In Malawi, nearly 25 percent of births occur within 2 years of a previous birth. The average interval is 2.3 years. Fourteen percent of births are those to teenage mothers, 7 percent to mothers over age 40 (half of those births being parity seven or higher). Access to family planning services has improved in recent years. But in 1990 only 200 of 748 health facilities offered such services. In 1984, about 1.6 percent of

women of reproductive years used modern contraception compared with about 3.4 percent in 1989. In 1987, children under age 5 and women of reproductive age constituted 43 percent of the Malawian population. Their large numbers place great demands on the fragile health care system and make improvements difficult.

Impact of USAID/Malawi Program on Child Survival

Analysis of the impact of USAID/Malawi's child survival program on child mortality and morbidity addresses activities in the following program areas: water supply, hygiene education, and sanitation promotion; malaria and HIV/AIDS control; child spacing, integrated maternal and child health care and under-5 services; and capacity building. References to achieved impact pertain to completed projects; analyses of current projects assess potential impact.

Water supply, health education, and sanitation promotion. Community-based rural water supply and sanitation activities are expected to reduce mortality and morbidity from waterborne and water-based diseases that are largely responsible for diarrheal diseases. Indirectly, such activities reduce mortality and morbidity by easing the water-collection burden on women (thereby increasing options to engage in primary health care activities) and improving community organization (leading to better opportunities to participate in health services).

Preliminary evidence suggests that the incidence of schistosomiasis, trachoma, and childhood diarrhea has declined with the use of A.I.D.-supplied piped-water schemes.

Impact assessment. Despite effective project interventions, impact has not been demonstrated conclusively.

Malaria control. Activities to control malaria include epidemiological research, research institution building, capacity strengthening for service delivery, and policy development and implementation.

Despite continuing research, not enough is known today to anticipate that Fansidar will be the silver bullet that substantially eliminates the malaria problem. Approaching the problem with long-term vision is critical to achieving permanent improvements in child survival. Continued research will be vital.

Impact assessment. Although A.I.D.'s assistance has led to effective malaria control activities, such as widespread distribution and availability of chloroquine, parasite resistance to that drug reversed the initial success of the program and increased malaria-related morbidity and mortality. But because

A.I.D.'s efforts helped Malawi identify and respond to the changing malaria situation, the potential for realizing future impact is improved greatly.

HIV/AIDS control. Principal activities include condom supply, training, technical assistance, surveillance, and information and education.

Because the AIDS problem is expected to get much worse in the near future regardless of the effectiveness of today's AIDS programs, measurement of impact will be especially difficult. The epidemic will probably mask the collective improvement caused by non-AIDS programs, so the assessment of the impact of child survival activities should be conducted on a program-by-program basis.

Impact assessment. The likely effect of AIDS on infant mortality has been minimal so far because the disease is in its early stages. To assess whether interventions pursued to date will result in reduced mortality would be premature.

Child spacing. Activities related to child spacing include contraceptive supply, service delivery, training, capacity building, population projections, and policy dialogue.

As noted earlier, the association between fertility and infant mortality is well established worldwide. Healthy fertility behavior should lead to immediate improvements in child survival, but fertility behavior is not quickly changed—such behavior being deeply rooted in cultural, societal, and economic beliefs and practices. AIDS is likely to directly affect fertility behavior, but the nature of the impact is unknown. Anecdotal evidence argues for both an increase and a decrease in fertility.

Impact assessment. The potential impact of the child-spacing program on reduction of child morbidity and mortality is significant. However, the program has not matured to the stage where impact can be observed.

Integrated maternal and child health and under-5 services. Those services embrace such activities as providing institutional support to the Ministry of Health for improved service delivery and giving child survival grants to five PVOs.

Determinants of maternal and child health are highly interrelated, as are childhood illnesses. An integrated approach to service delivery promotes the notion of "the healthy child"—rather than independent treatments of interconnected disease conditions—and leads to more effective disease prevention and case management. The impact of the Ministry of Health change from vertical to integrated services delivery will be difficult to assess in the absence of controlled comparisons. A difficulty will be to distinguish effects resulting from

differences in approach from those caused by improvements in services or other factors.

Impact assessment. To evaluate impact is premature in the absence of evidence of effectiveness. However, integrated services offer the potential for significant improvements in child and maternal health care.

8. RELEVANCE

Relevance addresses the appropriateness of child survival interventions given existing conditions in Malawi. Do program interventions target critical child survival problems and take account of local conditions?

The analysis of relevance focuses on two types of interventions in USAID/Malawi's health portfolio: direct interventions, which target service delivery, and indirect interventions, which focus on building the capacity of the health care system.

Service Delivery Interventions

The causes of childhood morbidity and mortality are varied, complex, and interrelated: high fertility, malaria and related anemia, malnutrition, diarrhea, measles, pneumonia, HIV/AIDS, and maternal mortality.

USAID/Malawi's high-profile, focused attack on child spacing, malaria control, and HIV/AIDS prevention is relevant to three of the most critical threats to child survival in Malawi.

The water-and-sanitation interventions seek to reduce the death toll of diarrhea on children. Although concrete data on that relationship are not available in Malawi, evidence from other countries suggests that the package of water and sanitation services does have a significant effect on child survival.

USAID/Malawi's effort to promote integration of maternal and child health care services is relevant. For example, childhood diseases and malnutrition overlap and share common treatments and preventive measures. Similarly, factors affecting maternal and child health are interrelated, as are childhood diseases.

Capacity-Building Interventions

A large portion of the USAID/Malawi health portfolio pertains to capacity building with the ultimate objective of developing an integrated, community-

based, family health services delivery system that implements child survival interventions on a sustained basis. Observation, interviews, and document review all confirmed the relevance of that approach.

Some child survival problems in Malawi, such as HIV/AIDS and malaria, are not well understood, and quick fixes are not available. Those problems require a comprehensive and flexible health care system capable of responding to a changing epidemiological environment. Given serious human and financial constraints plaguing the health care system, a focus on capacity building appears to be the most promising child survival intervention over the long term.

The specific capacity-building targets are personnel supply, planning, research, epidemiology, health information, health education, and integrated services:

- *Personnel supply.* Malawi's personnel shortage is well documented and unanimously acknowledged as one of the most severe constraints confronting the health system. Estimated personnel ratios are as follows: doctors, 1 for every 60,000 Malawians; clinical officers/medical assistants, 1:11,300; registered nurses, 1:12,000; enrolled nurses, 1:4,000; and HSAs, 1:16,000.
- *Planning.* A large number of donors are involved in more than 60 activities under way in Malawi's health sector—the situation can lead to duplication and inefficiency. Planning tends to occur at the project level. But comprehensive plans to guide activities, such as a personnel development plan, do not exist.
- *Research, epidemiology, and health information.* Questions pertaining to combating AIDS and malaria require answers and new technologies. Gaps exist in understanding behavioral change and how to influence it. Thus, effective service delivery requires research and relevant information accessible in a timely manner. Such information includes policy-related research, disease-specific information, and routine information on mortality, morbidity, and health services delivery. Although much research is completed and under way, data analysis and plans for using research findings are nonexistent, as are trained epidemiologists.
- *Health education.* Historically, Malawi has assigned a low priority to health education. The country has only a few trained health educators and no career structure for health education. Health education about the sensitive subject of sexual behavior must occur in connection with child spacing and HIV/AIDS control. Regarding diarrheal disease

control and nutrition, health education is needed to help mothers change their child care practices.

- *Integrated services.* Interrelated health problems require an integrated health services delivery system, which A.I.D. is supporting.

Given the health environment in Malawi, the current approach of focusing on capacity building as an indirect child survival intervention, complemented by direct service delivery interventions for the most critical health problems, shows the most promise for long-term, sustainable improvement in child survival.

9. CONCLUSIONS

This section summarizes the evaluation team's most important general findings and conclusions.

1. *Female illiteracy is a critical obstacle to child survival.* The illiteracy rate among women in Malawi is high. This has critical implications for child survival in general and for the success of health services for mothers and children. Research shows a strong correlation between education of females and the adoption of improved practices pertaining to family health, child survival, nutrition, and family planning.

During the 1988-1989 school year, only 43 percent of primary school age children were enrolled. The national literacy rate was 29 percent in 1987, and literacy among females is even lower. A.I.D., the World Bank, and other donors are assisting Malawi in reforming its educational system. In addition, A.I.D.'s PHICS project will attempt to address the current effects of low female educational attainment and literacy on adoption and use of effective health practices.

2. *The shortage of trained health personnel severely limits the quality and quantity of child survival services.* At many rural health centers, medical personnel may see up to 200 patients a day. The country's largest hospital, in Blantyre, processes about 700 children daily in under-5 clinics. Historically, the deficit of trained personnel has been exacerbated by personnel policies in government agencies—for example, with respect to remuneration and conditions of services—that have tended to drive people away from service.

Donors have long recognized the critical importance of the personnel shortage, and USAID/Malawi has been especially responsive for many years. Despite definite improvements, the Ministry of Health has not been able to match the nation's supply of health workers with the demand for them. So the shortage continues; child survival and other health programming suffer because of it.

3. *Child survival services have benefited from being integrated within the broader national health portfolio.* Malawi's integrated approach has avoided the creation of a vertical "child survival unit" or vertical units for vaccinations, CDD,

and so on, each with its own hierarchy, staff, information systems, and goals. By not creating vertical child survival structures, the prospects are greater that at least some of the child survival agenda will be adopted and sustained by the Ministry of Health after external support ends.

Integrated clinics maximize opportunities for contact with the mother and child during one visit. Also, they improve the utilization of scarce health personnel.

4. Many different donors creates a management burden for the Malawi Government. A 1988 survey of external assistance to Malawi found that 16 donors were funding more than 60 health projects. Despite the special requirements imposed by donors on the Malawi Government, especially on its Ministry of Health, the Government continues to ask for new assistance. Donors continue to offer it because of Malawi's great need.

Some of the donors have misgivings about the demands they have made on the Government in terms of the number, size, and complexity of their projects. A.I.D. deserves credit for recently taking steps to reduce the number of projects to make its health portfolio more manageable for both A.I.D. and the Government of Malawi.

5. HIV/AIDS is a major threat to child survival in the future. In Malawi, nearly 10 percent of the population is infected with the HIV virus. Some studies estimate that due to HIV, the infant mortality rate may increase by as much as 50 percent over the next 10 years.

A.I.D. is a major contributor to Malawi's National AIDS Control Program (NACP) and will undertake a new \$45 million project in response to the widely held view that AIDS is a looming health catastrophe. Prevention is the only available effective intervention. Yet the magnitude of that response must not eclipse recognition of the impact of other diseases on child survival.

6. Interest in controlling diarrheal diseases has declined. The Ministry of Health, USAID/Malawi, and other donors have been unable to maintain the same level of attention to CDD as they have to other child survival problems. The Malawi Government's policies on controlling diarrheal diseases are not entirely clear, and procedures in health units are not consistent.

7. Malaria is the greatest barrier to further decline of infant and child mortality. Malaria's growing resistance to chloroquine has stymied continued success of USAID/Malawi's malaria control program. Indeed, malaria is more

common now than in the 1980s and is the cause of a reversal of previous improvement in child mortality. Clearly, the current malaria situation in Malawi poses a major dilemma.

8. *Donor support for child survival is unpredictable.* Recently, UNICEF/Malawi had a drastic shortfall in funding for immunization. Through an emergency grant from the Africa Bureau of A.I.D., UNICEF was able to assist Malawi and five other countries maintain program coverage for 1 year. In general, A.I.D. and other donor support for child survival varies from year to year. Some A.I.D. regional programs that support child survival are being scaled back. As a consequence, previous improvements in some health conditions may be difficult to sustain, and meaningful long-range planning is tenuous. Longer term donor commitments, better donor coordination, and more donor emphasis on building local sustainability would be in the long-range best interest of Malawi.

9. *In economic terms, child survival is a justifiable investment.* As demonstrated in Malawi, even in the poorest countries (those with very low incomes and high child mortality rates) sizable child survival investments are likely to be economically justified.

10. *Sustainability is the most important but also the most difficult objective of A.I.D. child survival assistance.* Sustainability has managerial, institutional, and financial dimensions. A.I.D., other donors, and the Malawi Government have given higher priority to the first two than to the third. Available evidence did not encourage the evaluation team to conclude that Malawi's prospects were good for financial sustainability of child survival services through fees for curative services or by increasing the private sector's role in providing child survival services. Malawi is a very poor country. However, the Malawi Government is beginning to consider cost-recovery mechanisms, and this is an area in which A.I.D. and other donors could assist by underwriting studies on willingness and ability to pay for health care services, cross-subsidization of preventive services from charges for curative services, pooled risk-sharing schemes, and general health care financing studies, including studies of the role of the private sector.

The Malawi assessment underscores a point noted in other country studies: for sustainability to be more than an empty objective, projects must explicitly spell out realistic sustainability targets and specify (1) a means to verify whether targets have been met and (2) the actions that will be taken, and why, if goals are or are not achieved. Specific questions could be posed at the project conceptualization and design stages to increase the likelihood of achieving sustainability.

11. *Institution building and integrated health programs can be effective approaches to assisting national child survival programs.* Many donors prefer directly subsidizing vertical health services for mothers and children, and this has also been A.I.D.'s approach in some countries. However, when other donors cover most of the immediate needs for service subsidies, A.I.D. can effectively take on the more difficult tasks of assisting in the areas of institutional strengthening and financial sustainability. The large commitment of USAID/Malawi to build up technical and managerial capabilities in the country's health sector has increased the quantity and quality of skills available within the Ministry of Health. Within such a strengthened health system, strong arguments exist for integrating child survival services with other related services within and outside the health sector. In addition to being an effective way to address interrelated disease conditions, an integrated approach enhances chances for a sustainable child survival agenda by precluding creation of a vertical child survival organization and its attendant hierarchy, staff, information system, and goals.

12. *Poor measurement of results weakens child survival programs.* In Malawi, as elsewhere, the reason for the lack of convincing measures of effectiveness, efficiency, and impact is the absence of good data. Health data may be costly to gather and analyze, but they are essential to effectively plan, manage, and finance child survival services.

APPENDIX A

ANALYSIS OF SUSTAINABILITY

Analytical Approach

Definition of Sustainability

Following the definition employed by the previous Center for Development Information and Evaluation (CDIE) study, sustainability in this analysis is defined as "the continuation of health benefits and activities at least 3 years after U.S. project funding terminated" (A.I.D. 1990). The sustainability analysis focuses primarily on the project level in accordance with this definition, with the exception of analysis of financial sustainability of ongoing projects (discussed later), which is concerned with the broader program level (i.e., the collection of projects).

Project Selection

Analysis of past projects is limited by definition to projects completed before 1989. Reflecting the relative newness of the USAID/Malawi's child survival program, only two major projects meet the selection criterion:

- Self-Help Rural Water Supply, 1980-1988
- A.I.D. Child Survival Initiative-Combating Communicable Childhood Diseases (ACSI-CCCD), 1984-1988/89

Shorter-term technical assistance projects and several smaller child survival grants to private voluntary organizations (PVOs) were completed prior to 1989 but are not considered in the analysis because necessary information on project activities and outcomes was not available to the assessment team.

Ongoing projects that were assessed for potential sustainability included those with a primary focus on child survival:

57

- Promoting Health Interventions for Child Survival (PHICS), 1989-1997
- PVO Child Survival Grants to Adventist Development and Relief Agency, International Eye Foundation, Save the Children Foundation, Project HOPE, and World Vision Relief and Development.

The Human Resources and Institutional Development project, which is strengthening the training capacity of Kamuzu College of Nursing, was not included because its focus is much broader than child survival. The 13 HIV/AIDS and population projects have also been excluded because they were being consolidated into the bilateral Support to AIDS and Family Health project and, therefore, were in a transition phase.

Analysis Questions

The following eight questions guided the analysis of *completed projects*:

- What were the project objectives and intended outcomes?
- What were the activities/interventions?
- What were the achievements/benefits?
- Are any of these activities taking place today? If so, who is carrying them out?
- Are any of the benefits evident today?
- Did the project have the six key characteristics for sustainability?
- Were there other program characteristics that led to sustainability?
- What were the contextual factors that may have constrained or facilitated sustainability of this project?

Analysis of *ongoing projects* was guided by the following five questions:

- What are the project objectives and intended outcomes?
- What are the activities/interventions?
- Does the project have the six key characteristics for sustainability?
- Does the project have other program characteristics that are expected to increase sustainability?
- What are the contextual factors that potentially could constrain or facilitate sustainability of this project?

94

Data Collection Methodology

Data Sources

Review of project documents and past project evaluations, key informant interviews with program managers, group discussions with program beneficiaries, and direct observation served as data sources for the sustainability analysis. Primary sources included


- Interviews at the central offices of the Ministry of Health and the Ministry of Works
- Observation of district and rural health facilities and interviews with health personnel in the Central and Southern Regions
- Interviews with all five PVO child survival grant project managers and staff with visits to four of the five project sites
- Visits to three villages in the Southern Region to meet with village health volunteers, village tap committees, and members of the communities
- Inspection of the Mirala piped water scheme intake and storage facilities in the Zomba district

Assessment Indicators

Two sets of indicator checklists were defined to measure

- Sustainability
- Key program characteristics hypothesized to promote sustainability

Indicators of sustainability included those used in the CDIE sustainability study (Box A.1). They were applied to the selected projects completed prior to 1989. An activity was considered sustained if it continued in 1992 in a manner compatible with the original activity, with support from the Malawi Government, communities, private sector, or other donors. Activities that have been continued by the Agency for International Development (A.I.D.) alone were not considered sustained. However, if an activity was continued jointly by A.I.D. and the Malawi Government, it was considered sustained. Achievements were considered sustained if the majority of the benefits achieved during the project were evident in 1992. For example, if most, but not all, of the personnel trained under the project are working today in positions compatible with their training, this achievement was considered sustained.



Box A.1
Indicators of Project Sustainability

Trained Personnel/Human Resources

- Are they working in the health sector?
- Are they working in the institutions that originally implemented the project?
- Are they working in positions and carrying out activities appropriate to their training?
- Are they receiving sufficient support to perform their functions as planned?

Physical Infrastructure/Equipment/Vehicles

- Does it still exist?
- Is it well maintained?
- Is it being used for original, or compatible, purposes?

Institutions and Financing

- Are they still functioning, including training programs that were established in the project?
- Are organizational structures intact?
- Has institutional capacity been maintained/expanded?
- Are functions/activities being performed effectively?
- Have sufficient resources been allocated to support efforts?

Source: A.I.D. 1990.

56

Indicator checklists of the six key program characteristics and their intended outcomes were derived from the *Sustainability Strategy* developed through the ACSI-CCCD project (1990). These indicators are presented in Box A.2. They were applied to the selected past and current projects.

Results

Sustainability of Projects Completed Before 1989

Sustained achievements and activities. Both the Self-Help Rural Water Supply project and the CCCD project identified sustainability as a concern in project design, implementation, and evaluation, but sustainability was not an explicitly stated objective in either project. Both projects were implemented in collaboration with the Malawi Government at the central, regional, and district levels. The Self-Help Rural Water Supply project operated in geographically defined areas in all three regions, while the CCCD project targeted both the national population of children under age 5 and the national health care system.

Activities and achievements of the two projects are summarized in Tables A.1 (activities) and A.2 (achievements). All activities were either sustained by the Malawi Government or other donors or continued by A.I.D. under the PHICS project. Activities that are being implemented by the Malawi Government with support and/or expansion from PHICS were considered sustained by the Malawi Government because of the collaborative nature of the project. Achievements are categorized simply as sustained, not sustained, or unknown.

Almost all of the activities of these two projects have been continued or expanded under the PHICS project. The exceptions are the expanded program for immunization (EPI) and control of diarrheal diseases (CDD) supported under the CCCD project. Even in these cases, the activities have not been dropped entirely in the PHICS project, but are subsumed under the integrated services delivery component. UNICEF has provided major support for EPI since the program began in the 1970s and continues today as the primary donor in this area. However, upon request from UNICEF in 1991, A.I.D. provided a grant to UNICEF for EPI which represented one-third of the annual budget for immunization. CDD activities have been the least sustained of any of the CCCD interventions. UNICEF continues to provide some support to this area. Activities

51

Box A.2
Indicators of Key Project Characteristics

Perceived Project Effectiveness

- Was the project effective?
- Were mechanisms established/strengthened to assess effectiveness?
 - Research activities and results
 - Health information systems
 - Management information systems
 - Monitoring and evaluation systems
- Were problems identified and appropriate solutions developed based on data collected and analyzed?
- Were mechanisms established/strengthened to communicate effectiveness?
 - Policies, strategies, program statements
 - Information, education, and communication
 - Dialogue

Project Integration Into Existing Institutional Hierarchies

- Were new activities integrated into existing structures or were separate vertical structures created?
- Were project activities and management integrated within and across government structures?
- Was integration of activities among staff promoted?
- Was coordination among component areas encouraged/improved?
- Were support activities integrated within component areas?
- Were services delivered in an integrated manner?
- Was a supervisory system established/strengthened?

Training Components

- Was there a training strategy?
- Was the training program based on a needs assessment?
- Have trainers been trained?
- Have training and supervision been integrated with one another?
- Have training programs been evaluated?
- Has in-service training been conducted?

58

Box A.2
Indicators of Key Project Characteristics

Established Funding

- Was financial commitment by sustaining institution encouraged early on and monitored?
- What percentage of funds was cofinanced?
- Were opportunities for cost recovery investigated?
 - Individual beneficiaries
 - Community committees
- Was private sector involvement investigated?

Mutually Respectful Project Negotiation Process and Community Participation

- Were nationals involved in policy-level development and negotiation of project design and amendments?
- Were nationals involved in technical-level development and negotiation of project design and amendments?
- Were workshops held with nationals to debate project design and implementation?
- Were various administrative units involved in project design?
- Were communities involved in project decision-making?

Source: ACSI-CCCD, 1990.

54

Table A.1
Sustainability of Past Projects: Activities

Table A.1 Sustainability of Past Projects: Activities			
	Sustained by		Continued Under PHICS
	Malawi Government	Other Donors	
<i>Self Help Rural Water Supply, 1980-1988</i>			
<i>Construction:</i> intakes; pipelines; tanks; and tap sites			✓
<i>Maintenance:</i> salaries; equipment; training; transport; operating costs; reference works and publications	✓		✓
<i>Monitoring, coordination, evaluation:</i> information systems; analyses	✓		✓
<i>Hygiene education and sanitation promotion (HESP):</i> construction of pit latrines, washing slabs; education and behavior change	✓		✓
<i>Institution strengthening - MOW:</i> water systems design, planning, procurement, construction; training; promotion of project committees			✓
<i>Institution strengthening - MOH:</i> HESP and environmental health; training of HAs, health inspectors, HSAs; promotion of village health committees			✓
<i>Combating Childhood Communicable Diseases 1984-1988/89</i>			
<i>EPI:</i> training of health workers; procurement of supplies and equipment; improved recording systems; coverage surveys; policy development	✓	✓	
<i>Control of diarrheal disease (CDD):</i> establishment of ORT corners; KAP surveys; development of national guidelines; procurement of supplies and equipment; training of community leaders; information, education, and communication	✓		
<i>Malaria:</i> development and distribution of treatment guides; research and clinical studies; revision of national malaria treatment and prophylaxis policy; technical support for community intervention; development of management structure for control activities	✓		✓

Table A.1
Sustainability of Past Projects: Activities (continued)

	Sustained by		Continued Under PHICS
	Malawi Government	Other Donors	
<i>Program management:</i> improvement of donor coordination; computerization of budgeting process; development of procurement and distribution process for vaccines; and cold chain malaria and ORT supplies	✓		✓
<i>Training:</i> revision of manuals and assistance with training project for CDD and malaria; regional workshops in planning and implementation; midlevel and senior-level management; training materials; primary health care workers and TBAs		✓	✓
<i>Health education:</i> development and distribution of posters, radio messages for malaria; educational materials for ORT; health education equipment; research	✓	✓	✓
<i>Health information system:</i> establishment and monitoring of sentinel/surveillance sites; computerization of HIS; development of baseline data indicators; curriculum development; installation of computer equipment; data analysis	✓		✓
<i>Operations research:</i> chloroquine resistance of malaria; KAP studies of CDD; malaria treatment in specialized populations	✓		✓

Note: EPI = expanded program for immunization HA = health assistants; HIS = health information systems; HSA = health surveillance assistants; KAP = knowledge, attitude, and practices; MOH = Ministry of Health; MOW = Ministry of Works; ORT = oral rehydration therapy; TBA = traditional birth attendant.

Table A.2
Sustainability of Past Projects: Achievements

	Sustained	Unsustained	Unknown
<i>Self Help Rural Water Supply, 1980-1988</i>			
Completed 18 water schemes	✓		
Provided piped water to 420,000 people	✓		
Reached 270,000 people with HESP activities	✓		
Constructed washing slabs and latrines	✓		
Improved water quality	✓		
Trained MOW and MOH staff	✓		
Promoted successful interministerial collaboration between MOW and MOH	✓		
<i>Combating Childhood Communicable Diseases, 1984-1988/89</i>			
Used operations research results to update public health policies and practices	✓		
Established model clinic in major hospital for EPI/ORT training			✓
Provided majority of health facilities with supplies, equipment, training in cold chain, sterile techniques for immunization	✓		
Developed/implemented national immunization policy	✓		
Improved coverage, access, quality of EPI			✓
Ensured all health facilities were using ORS by 1986			✓

2

Table A.2
Sustainability of Past Projects: Achievements (continued)

	Sustained	Unsustained	Unknown
Established ORT corners in majority of health facilities	✓		
Developed national guidelines for CDD	✓		
Ensured all health facilities using treatment guidelines for malaria	✓		
Revised national malaria plan based on research findings	✓		
Instituted numerous research activities on malaria	✓		
Improved overall service delivery			✓
Trained more than 3,000 MOH personnel	✓		
Trained more than 3,700 village health workers and TBAs	✓		
Developed and distributed educational materials for ORT and malaria	✓		
Established computerized HIS and sentinel surveillance system	✓		
Developed 10-month training course in epidemiology			✓
Trained 80 staff in data collection and analysis	✓		
Provided computers and software for HIS	✓		

Note: CDD = control of diarrheal diseases; EPI = expanded program for immunization HESP = health, education, and sanitation promotion HIS = health information system; MOH = Ministry of Health; MOW = Ministry of Works; ORS = oral rehydration salts; ORT = oral rehydration therapy; TBA = traditional birth attendant.

163

are continued by the Ministry of Health, but are combined under one administrative program that also manages malaria activities. The latter activities are given much higher priority, in part because they receive greater donor support.

The achievements of both projects have been highly sustained since project termination. A possible contributing factor to this high level of sustainability is that the majority of the activities that produced these achievements are continuing today under the PHICS project. For example, the 18 gravity-fed piped water schemes constructed under the Self-Help Rural Water Supply project still provide water to communities, because the technology on which they are based is appropriate, they are well constructed, and the maintenance system operated by the Ministry of Works in conjunction with village tap committees functions well. The maintenance system receives continued support through capacity building activities in the Ministry of Works under PHICS. In this situation, since A.I.D. support continues, it is difficult to attribute sustainability exclusively to past project design and implementation.

In some cases, the extent to which achievements have been sustained is unknown. For example, although the assessment team observed oral rehydration therapy (ORT) corners in the health facilities visited, it is not known how many ORT corners exist, and if they do, how well they are maintained and used.

Key project characteristics. Both the Self-Help Rural Water Supply project and the CCCD project are well described by the key project characteristics found previously to promote sustainability. These characteristics are summarized in Table A.3 and discussed below.

Perceived Project Effectiveness. Both projects have been perceived by the Malawi Government and Malawian beneficiaries as highly effective. Since its beginning in 1968, the rural piped water scheme has attracted worldwide attention for its successes in low-cost technology, community participation, and local operations and maintenance. The Self-Help Rural Water Supply project continued the successes achieved in previous years and added the highly regarded HESP component. The water schemes have been popular among village beneficiaries who contributed significantly to labor for construction and maintenance. Limited research has been conducted to assess the health benefits resulting from the improved water supply and sanitation facilities, although the HESP messages appear widespread. Monitoring and evaluation systems for water scheme maintenance were strengthened and continue to function well.

64

Table A.3
Presence of Key Project Characteristics

	Projects Completed Before 1989					
	Self-Help Rural Water Supply			CCCD		
	Yes	No	Unknown	Yes	No	Unknown
<i>Perceived Project Effectiveness</i>						
Project effectiveness demonstrated	✓			✓		
Mechanisms established/strengthened to assess effectiveness						
- Research activities and results		✓		✓		
- Health information systems		✓		✓		
- Management information systems			✓	✓		
- Monitoring and evaluation systems	✓			✓		
Problems identified and appropriate solutions developed based on data collected and analyzed	✓			✓		
Mechanisms established/strengthened to communicate effectiveness						
- Policies, strategies, program statements			✓	✓		
- Information, education, and communication	✓			✓		
- Dialogue	✓			✓		
<i>Project Integration Into Existing Institutional Hierarchies</i>						
New activities integrated into existing structures rather than creating separate vertical structures	✓			✓		

65

Table A.3
Presence of Key Project Characteristics (continued)

	Projects Completed Before 1989					
	Self-Help Rural Water Supply			CCCD		
	Yes	No	Unknown	Yes	No	Unknown
Project activities and management integrated within and across government structures	✓			✓		
Coordination among component areas encouraged/improved	✓			✓		
Support activities integrated within component areas			✓	✓		
Services delivered in an integrated manner	✓			✓		
Supervisory system established/strengthened			✓			✓
Training Components						
Training strategy developed			✓			✓
Training program based on a needs assessment		✓			✓	
Training of trainers	✓				✓	
Integrated training and supervision			✓			✓
Training programs evaluated	✓			✓		
In-service training conducted	✓			✓		

Table A.3
Presence of Key Project Characteristics (continued)

	Projects Completed Before 1989					
	Self-Help Rural Water Supply			CCCD		
	Yes	No	Unknown	Yes	No	Unknown
<i>Established Funding</i>						
Financial commitment by sustaining institution encouraged early on and monitored	✓			✓		
Opportunities for cost recovery investigated	✓			✓		
Private sector involvement investigated		✓			✓	
<i>Mutually Respectful Project Negotiation Process and Community Participation</i>						
Nationals involved in policy-level development and negotiation of project design and amendments			✓			✓
Nationals involved in technical-level development and negotiation of project design and amendments	✓			✓		
Workshops held with nationals to debate project design and implementation			✓			✓
Various administrative units involved in project design	✓			✓		
Communities involved in project decision-making	✓				✓	

The CCCD project has been highly regarded for its research component and the influence of research results on policy. Successes in malaria policy and planning are especially noteworthy, where research was conducted in conjunction with the Mangochi Malaria Research Project. The CCCD project greatly improved the capabilities to demonstrate effectiveness and impact by strengthening the national health information system and by encouraging policymakers and planners to use it.

Project Integration Into Existing Institutional Hierarchies. Both projects were integrated within existing Malawi Government structures: the Self-Help Rural Water Supply project was integrated within the Ministry of Works, and the CCCD project was integrated within the Ministry of Health. The Self-Help Rural Water Supply project was highly successful in promoting collaboration between the Ministry of Works and the Ministry of Health in implementation of the HESP component. The CCCD project promoted collaboration across Ministry of Health administrative units to provide integrated services. They encouraged integration of health education activities carried out by the Health Education Unit with the malaria, CDD, and EPI units. Information was not available concerning the extent to which the projects helped establish or strengthen supervisory systems or management systems in general.

Training Components. The Self-Help Rural Water Supply project had a major component to train Ministry of Health personnel in the training of health surveillance assistants (HSAs) in hygiene education and sanitation. The CCCD project focused its training efforts on developing training materials and in-service training for midlevel Ministry of Health personnel who manage and deliver services in EPI, malaria, and CDD and for information systems managers. Both projects provided considerable training, but it appears that neither project conducted training based on longer term needs assessment. It is not known whether training strategies were developed.

Established Funding. Financial commitment by the Malawi Government to both projects was requested and agreed on early, but the extent to which the commitments were timely met is unknown. Malawi resources in the Self-Help Rural Water Supply project included significant input of local labor for construction and maintenance of the water schemes. The 1989 evaluation of the CCCD project indicated that although the Malawi Government was committed to the project, its financial contributions were limited by the poor economic situation, and there was little financial accountability. However, the fifth-year evaluation report (1987) indicated that in contrast to other CCCD countries, the Malawi Government "exceeded (its) share of contributions stipulated in the(ir) grant agreement budget(s)" (p.8).

63

According to the 1989 CCCD evaluation, cost-recovery studies were undertaken and pilot community intervention mechanisms for cost recovery were developed. Information on the outcome of these activities, however, was not available to the CDIE team. Cost recovery opportunities for the piped water schemes have been investigated subsequent to completion of the project. Preliminary data collection and analysis have been undertaken to determine how communities can further contribute to the maintenance of their water schemes.

Mutually Respectful Project Negotiation Process and Community Participation. It appears that Malawi Government personnel were closely involved in project design and implementation of both projects at the technical level, although the form of this involvement (e.g., workshops, day-to-day interactions) is unknown. The extent to which project design and amendments were truly negotiated, and the level of negotiations, are unclear. In both projects, however, dialogue among A.I.D. and the Malawi Government and Malawians appears highly satisfactory. In particular, the Self-Help Rural Water Supply project involved local communities in their decision-making; the CCCD project worked closely with policymakers to develop national strategies and plans for EPI, CDD, and malaria.

Other characteristics. As discussed earlier, it is difficult to assess the true sustainability of these projects because so many of the activities are continuing under PHICS. Thus, it is difficult to ascertain which of the key project characteristics may have contributed most to sustainability or whether there were other important aspects of the projects that influenced sustainability. Based on the CDIE team's observations in the field, however, sustained achievements are more apparent in the Self-Help Rural Water Supply project, although the two projects show comparable ratings on the presence of the key sustainability characteristics. One explanation for this difference is that the technology applied in the Self-Help Rural Water Supply was appropriately simple and effective. The CCCD project did not enjoy this advantage. It addressed a broader range of more complex problems, equipped with a limited number of simple solutions. The effectiveness of its interventions was more difficult to demonstrate. This suggests that project effectiveness itself, apart from perceptions of it, may play an important role in sustainability.

Contextual factors. The political environment was favorable and supportive for both projects. The Malawi Government had more than a decade of experience with piped water schemes when the Self-Help Rural Water Supply project was initiated. The importance of safe water and sanitation and the role communities have to play in their establishment and operations continues to be recognized. Moreover, the Malawi Government and the people of Malawi were committed to the goals of the CCCD project. Reducing child morbidity and

mortality and expanding primary health care services remain major health objectives of the Malawi Government.

The economic and institutional environments were somewhat less facilitative. Both a struggling economy and a severe shortage of personnel constrain Malawi's ability to sustain donor-initiated activities. What is not yet clear from past research on sustainability or from the Malawi experience is whether certain financial and institutional conditions that must exist before full-fledged sustainability can be reasonably expected.

Potential Sustainability of Current Projects

PHICS Project

Sustainability is a clearly articulated goal of PHICS. As stated in the Project Paper, the purpose of the project is

to increase the institutional capacity of the Ministry of Health and the Ministry of Works to deliver and sustain health and child survival services; and to increase the supply and utilization of these services at the family and community level (A.I.D. 1989).

As previously described, the PHICS project continues many of the activities originated under the Self-Help Rural Water Supply project and the CCCD project. Thus, activities regarded as promoting sustainability in these past projects are, for the most part, present in PHICS. However, implementation of these activities has changed; activities are now fully incorporated within the Ministry of Health and the Ministry of Works. PHICS is providing support to the Rural Water Supply section of the Ministry of Works and to 10 administrative units, or sections, within the Ministry of Health:

- AIDS Secretariat
- Community Health Services Unit
- Environmental Health Section
- Family Health Services Unit
- Health Technical Support Services, Research Unit
- Health Education Unit
- Lilongwe School of Health Sciences
- Manpower Development Unit
- Planning Unit
- Project Implementation Unit

The potential for sustainability was determined by the presence of key project characteristics hypothesized to promote sustainability. A subset of the key project characteristic indicators (Box A.2) that could be applied appropriately to ongoing projects was identified. Rather than evaluating characteristics that might be unique to a particular component of the project, the CDIE team used only those indicators that were relevant to all project components. Each of the eleven administrative units was then evaluated for the presence of these indicators. The information was collected through key informant interviews with unit representatives. The results are summarized in Table A.4.

Perceived Project Effectiveness

Three characteristics were used to measure the potential for demonstrating perceived effectiveness: whether a strategy and set of objectives were developed, whether an annual workplan was developed and used, and whether there was a management information system in place for monitoring and evaluating unit activities. Although all units had annual workplans (a PHICS project requirement) and most had defined strategies and objectives, only half of the eight units had management information systems in place. In several instances, the lack of such a system was identified by the interviewee as a constraint.

Project Integration into Existing Institutional Hierarchies

All project activities have been integrated existing the Ministry of Health and the Ministry of Works structures with the exception of the Manpower Development Unit within the Ministry of Health. In the latter case, the PHICS project is helping to establish the unit to strengthen the Ministry of Health capacity in manpower planning and coordination of training activities. Support activities, such as those provided by the Health Education Unit, are well integrated among those who employ such services. There is a high degree of interaction among the eight PHICS-supported units assessed.

Training Components

Some 88 percent of the eight units supplying information provide training, both within their unit and to others outside the unit. Two of the units have training as their primary responsibility. In these cases, training in supervision is also provided. Four out of five of the units assessed provide in-service training, and five out of six have training plans. Lack of coordination and integration of

Table A.4 Key Project Characteristics Among Ministry of Health and Ministry of Works Units Supported by PHICS Project	
	Percentage of Units^a With Characteristics/Activity (number of units with characteristics/number of units^b responding)
Perceived Project Effectiveness Have strategy and objectives Develop annual workplan Have management information system for monitoring and evaluation	78 (7/9) 100 (9/9) 50 (4/8)
Project Integrated Into Existing Institutional Hierarchies Integrate PHICS activities into existing structures Interact regularly with other PHICS-supported units Integrate support activities (i.e., HEU) within unit	91 (10/11) 88 (7/8) 100 (4/4)
Training Components Training provided Training plan developed/used Training in supervisory skills offered In-service training offered Training integrated with other Ministry training programs	88 (7/8) 83 (5/6) 100 (2/2) 80 (4/5) 50 (1/2)
Mutually Respectful Project Negotiation Process Play a strong role in project decision-making	100 (7/7)

Note: HEU = Health Education Unit; PHICS = Promoting Health Interventions for Child Survival Project.

^aA total of 11 PHICS-supported Ministry of Health and Ministry of Works units were analyzed.

^bNot all information was collected or available for each unit.

12

training activities across units is a serious problem. The new Manpower Development Unit will be responsible in the future for promoting better coordination.

Mutually Respectful Project Negotiation Process

Of the seven units assessed, all unit representatives stated that they play active roles in project negotiations and decision-making. This is one of the key principles on which the project is founded and it appears that it has been translated into action. Although those interviewed remarked that it was a strength of the project that "no one decides for us," it was also cited as one of the biggest constraints to "getting things done."

Contextual Factors

The most serious constraint the PHICS project faces is also one of the most important problems it addresses: a severe personnel shortage. Trained staff are spread thinly throughout the Ministry of Health and Ministry of Works. Efforts to alleviate this shortage are threatened further by the AIDS epidemic. The disease is striking civil servants and professionals in the prime of their careers—precisely those who are best prepared to carry forward efforts initiated today. All predictions agree that the situation is going to become significantly worse over the next decade.

The personnel shortage is exacerbated by continued low primary and secondary school enrollments that will limit the pool of eligible candidates in the future. Fewer than 5 percent of Malawi's population over the age of 5 have completed secondary school. The human resource situation imposes serious constraints for efforts to sustain achievements in health care delivery.

Private Voluntary Organization Child Survival Grants

On the other end of the sustainability continuum from the PHICS project are the PVO child survival grants. When asked what role PVOs play in Malawi, three of the PVO project managers responded that PVOs

- "Initiate new ideas"
- "Serve as catalysts to make things happen"
- "Focus efforts for more immediate impact"

17

The PVO efforts tend to be more experimental in nature, investigating new approaches to services delivery on a smaller scale in anticipation that the lessons learned will be valuable for broader application.

Ranging in duration from 2 to 3 years, the five PVO child survival projects are not designed with sustainability as a primary objective, although the concern for sustainability has been growing. For example


- The current International Eye Foundation project differs from its predecessor project in its greater emphasis on strengthening local institutions.
- The Save the Children Foundation project anticipates that the health information system established under the project can be sustained by the communities with whom they are working.
- The World Vision Relief and Development project plans to introduce a community-based drug revolving fund.
- The Adventist Development and Relief Agency proposes that many of its activities will be sustained by the villages.
- Project HOPE is working with the private sector tea estates under the assumption that the private sector offers an important opportunity for sustaining child health care services.

Each of the PVOs operates within a defined geographic region. There is one project each in the Northern and Central Regions, and three in the Southern Region. This distribution is appropriate, based on the severity of child morbidity and mortality in the south.

As noted below, indicators of key project characteristics for sustainability were less relevant for assessing PVO project sustainability, so the presence and absence of key characteristics are discussed more generally.

Perceived Project Effectiveness

The ability to demonstrate effectiveness is of primary concern to these projects and is probably the key to their sustainability. While project-initiated activities themselves may face limited opportunity to be sustained, efforts should be made to sustain the ideas and knowledge generated from them. Doing so requires sound information systems to document, monitor, and evaluate interventions and mechanisms for communicating findings and lessons learned. All projects have collected baseline information through surveys of their target populations and have established systems for monitoring activities. Project HOPE has created a very comprehensive management system motivated by the need to



be able to demonstrate program effectiveness to estate managers who ultimately will determine the fate of project interventions.

Project Integration into Existing Institutional Hierarchies

All PVO projects are promoting integrated services delivery. All projects—including Project HOPE, which works with the private sector—are required to follow the Ministry of Health policies and guidelines. Therefore, they all provide services that are coordinated with services of the Ministry of Health. The extent to which this is intended to strengthen local institutions, or in fact does, has not been investigated. The PVO projects enjoy supportive collaboration and coordination with each other. Project managers meet regularly to address common concerns and share experiences. This appears to help strengthen the presence of PVOs, providing them leverage to influence larger institutions.

Training Components

All PVO projects provide training focused at the village level. The HSA training is an important component of each project to strengthen the link between villages and the Ministry of Health health care system. The extent to which training strategies are developed, supervisory training is offered, and training is coordinated with Ministry of Health training varies among the five projects.

Community Participation

Community participation plays an important role in each of the community-based PVO projects. A primary objective of several of the projects is to strengthen the capacity of community leaders to address the health needs of their constituencies. Communities offer the best potential for sustaining activities initiated under these projects.

Mutually Respectful Project Negotiation Process

Most of the PVO projects are guided by policies and regulations set forth by their organization headquarters. In this respect, opportunities for negotiation with nationals concerning project design and implementation are limited.

1
12

However, all projects appear to promote collaborative working environments, providing opportunities for input and dialogue among staff regarding day-to-day operations.

Contextual Factors

The short duration of the PVO child survival grants severely constrains their capacity to promote sustainable activities and achievements.

Financial Sustainability

The level of financial support, both internally and from the donor community—and of cost recovery and financial accountability/record-keeping—have profound influences on whether ongoing projects (or their desired outcomes) are sustained over time. For simplicity of discussion, the financial analysis is focused on ongoing efforts. It is assumed that questions about financial sustainability are most critical for continuing projects that are intended to strengthen institutional capacity and human resources in Malawi over the long term.

Analysis questions and data collection methodology for the financial sustainability analysis differed from that described above. There are three criteria that can be used to evaluate the potential for financial sustainability of the Malawi child survival program:

- Assumption of child survival program costs by the Government
- Cost recovery
- Privatization of child survival services

Assumption of Program Costs by the Malawi Government

In general, governments that include in their budgets successively larger portions of recurrent child survival program costs will more likely be able to allocate resources to child survival program activities if A.I.D. funding is withdrawn. Some projects contain explicit agreements, or conditions precedent, that require the government to gradually absorb increasing proportions of recurrent costs during the life of the project.

Of the current child survival program portfolio, the Malawi Government has provided written assurance that recurrent costs of the PHICS project will be

16

assumed according to an agreed-upon schedule, and the assumption of recurrent costs was a condition precedent for the project. PHICS is by far the largest ongoing project in the current portfolio. The Support to AIDS and Family Health project, which is currently being developed, will be nearly twice as large as PHICS. When operational, the Support to AIDS and Family Health project combined with PHICS will represent well over 80 participants within the population, health, and nutrition portfolio.

Some of the PHICS inputs that assist Ministry of Health programs are likely to continue to be used in post-project years. Trained staff, for example, may require Ministry of Health funding for salaries once PHICS is no longer paying these costs. In this way, PHICS implies an increase in recurrent costs for the Ministry of Health in post-project years.

PHICS requires that the Ministry of Health assume 25 percent of some of the recurrent costs in the fifth project year, 50 percent in the sixth project year, 75 percent in the final project year, and 100 percent in the first post-project year and thereafter. It remains to be seen whether the Malawi Government will honor its commitment to assume these costs. Unfortunately, many of these types of agreements have not been honored by governments in the past, in part because of declining real public budgets in recent years.

Malawi is one of the poorest countries in the world, and funding levels for health care administered by the Ministry of Health historically have been low. The Malawi Government budget allocation for Ministry of Health in the 1990-1991 fiscal year, for example, was about 8 percent and was not sufficient to cover full operating costs for existing services, much less to assume additional recurrent costs of new projects.

One way to evaluate whether the Malawi Government is likely to begin to establish the basis for financial sustainability of the PHICS project is to compare the incremental recurrent costs required by PHICS to the projected total Ministry of Health recurrent budget. In this respect, the recurrent cost burden is relatively small. Required increases in recurrent costs range from 0.3 percent in the fifth project year to 1.1 percent when 100 percent of costs are assumed. Even when recurrent costs are compared with incremental increases in the Ministry of Health recurrent budget, the percent only increases from 5.2 in the fifth year to 15.7 percent when 100 percent is assumed (A.I.D. 1989). Thus, if the Malawi Government fulfills its planned increases in the Ministry of Health recurrent budget, it appears that the Ministry of Health will have sufficient funds to sustain the PHICS project if it so chooses.

77

However, the other major project in the portfolio, Support to AIDS and Family Health, will require substantial resources by the end of the decade if it is to be financially sustained. It is not known whether a condition precedent for recurrent costs will be negotiated by the Malawi Government for this project. Combined, the child survival program parts of the PHICS and Support to AIDS and Family Health projects, and several relatively smaller PVO grants, will likely present a considerable challenge for financial sustainability by the end of the century.

One reason it may be possible for the Ministry of Health to have the funds necessary to sustain the child survival program is that the Malawi Government entered into an agreement with the World Bank for a Population, Health, and Nutrition (PHN) Sector Credit that requires the Ministry of Health recurrent budget to gradually increase to about 11 percent of the Malawi Government recurrent budget by 1995-1996. If economic growth occurs and the Malawi Government budget increases, the Ministry of Health budget should increase, at least nominally. In addition, the Sector Credit requires that the Ministry of Health restructure the recurrent budget to give increased priority to peripheral and outreach services. The proportion of the Ministry of Health budget devoted to peripheral health services, for example, would increase from 14 percent to 23 percent in 1995-1996 (World Bank 1991a). Because most child survival program preventive services are likely to be concentrated in peripheral health centers, it is likely that this shift in priority will increase the likelihood of financial sustainability of child survival services.

In real terms, the Ministry of Health development budget has been increasing in recent years, while the recurrent budget has remained relatively constant. This suggests that if the trend continues the recurrent costs required to sustain A.I.D. projects may actually be financed through substitution of other donor funds rather than be fully integrated into the Ministry of Health recurrent budget for child survival activities.

Cost Recovery

A second potential means to help financially sustain child survival program activities is through cost-recovery mechanisms, like charging fees for service for private patients. Cost-recovery efforts are gaining support throughout Africa, and recently the Malawi Government has indicated its intent to institute cost recovery in certain circumstances in major hospitals. In fact, under the Population, Health, and Nutrition Sector Credit, the Malawi Government is actually supposed to increase fees for private patients at hospitals later this year.

18

Because the majority of child survival program activities are primarily preventive rather than curative (e.g., immunization, malaria control, AIDS control, birth spacing), charging fees for curative services could help to sustain child survival activities financially to the extent that revenues are used to cross-subsidize these activities. That is, charging fees for curative services can help to relieve the budget constraint for preventive child survival services but only if the Ministry of Health redirects these revenues.

Cost recovery for health care is still in its infancy in Malawi, and much must be done before it is likely to have a substantial impact on the national health care budget. Because such a large majority of the population live in rural areas and are subsistence farmers, or are unskilled laborers with very low incomes, the potential for raising significant funds from those with an ability to pay for curative services is not expected to be large.

The estimated 1991-1992 Ministry of Health recurrent budget for all health institutions is about K64 million, or 81 percent of the total the Ministry of Health recurrent budget (K79 million). Of this amount, the recurrent budget for the three major hospitals where fee for service is likely to be instituted (Kamuzu Central, Queen Elizabeth Central, and Zomba General) is K24.3 million, or 30 percent of the total the Ministry of Health recurrent budget. This suggests that even if 10 percent (a large assumption) of the recurrent budget at the three major hospitals could be recovered through fees for curative services, only about 3 percent of the total the Ministry of Health recurrent budget would be offset.

However, if 3 percent of the total the Ministry of Health recurrent budget could actually be recovered, and this revenue was redirected to preventive child survival services, probably all of the required PHICS recurrent costs would be offset.

Private Sector Provision

Another potential mechanism for reducing the burden of child survival program costs on the public sector is through an increase in the private sector's role in providing child survival services. Given limited public revenues, for example, governments can help develop the capacity of traditional birth attendants, village health workers, and other private individuals and organizations, both commercial and PVOs to deliver effective child survival interventions.

The Malawi child survival program supports several PVOs through grants for child survival services. In addition, the Ministry of Health gives an annual

79

subsidy to the Private Hospital Association of Malawi (PHAM) that amounted to about 7 percent of the Ministry of Health recurrent budget in 1990-1991.

PHAM consists of religious and other PVOs that operate hospitals and rural hospitals and health centers in the country. PHAM hospitals account for about one-third of all admissions and for nearly one-half of the other health services nationwide. The services offered by PHAM are similar to those of the Ministry of Health, but fees are charged for curative services at PHAM facilities, though preventive services are free.

While this is evidence that capacity building in the private sector is occurring in Malawi, there is little evidence that the private sector is a viable alternative for public-sector financed child survival services. The PVOs that are supported directly by A.I.D. rely heavily on this support and are essentially agencies that A.I.D. contracts out using public sector funds. Similarly, PHAM is contracted out with public funds by the Ministry of Health for preventive child survival services that are given free.

It is not known how heavily PHAM-member institutions rely on the Ministry of Health funding for financial viability, but several have requested the Malawi Government to take over their operations (World Bank 1991). This indicates that the revenues from the fees charged to patients for curative care may not be sufficient to maintain operations in some cases. Moreover, because preventive child survival services are provided free, PHAM is simply an extension of the public sector for these services in Malawi. Thus, privatization—in the sense that these institutions could be completely self-financed by private expenditures by individuals for child survival services—is not very likely at this time.

80

APPENDIX B

ANALYSIS OF EFFECTIVENESS

Some of the major constraints faced by USAID/Malawi in its efforts to strengthen the health delivery system and improve child survival provide perspective for the effectiveness analysis. They are as follows:

Policy

In general, Malawi's health policy environment is conducive to the pursuit of primary health care objectives. However, in a few areas further policy dialogue and clarification is needed. As described below, these areas include child spacing, the control of diarrheal diseases (CDD), and cost recovery.

Staffing

A shortage of trained personnel is a critical and pervasive constraint throughout the health care system. (Health and population staffing shortages have also affected the USAID/Malawi office, with one direct-hire health officer position vacant for the past 3 years.) These constraints affect every aspect of the system. The staffing shortage in the Malawi Government creates a catch 22: interventions designed to increase and strengthen staff capacity are hampered by the lack of staff available to implement them.

Logistics

The health care system is also limited by lack of transportation, equipment, and basic supplies. The shortages are sporadically and temporarily ameliorated by inputs from various donors. Eventual budget increases encouraged by A.I.D. and other donors may improve the situation. However, functional systems of inventory, equipment maintenance, cost recovery, and the like will be required to resolve the logistics constraint over the long term.

-81-

Administrative Issues

USAID/Malawi's success in establishing a partnership with the Ministry of Health bodes well for sustainability. However, there are negative aspects to this relationship. Complete integration of A.I.D.-supported activities within the Ministry of Health system means that every project activity is encumbered by two sets of bureaucratic rules and procedures, resulting in delays in recruitment, procurement, and approvals and complex financial disbursement and accounting procedures. The Ministry of Health and A.I.D. officials have been frustrated by these constraints but appear to agree on the ultimate objective of building sustainable systems.

Although efforts are now being made to improve the availability and quality of health information in Malawi, data on service delivery and performance, such as case management practices, are sparse. This limits capacity for monitoring and evaluating of programs and activities.

Specific Findings on the Service Delivery Interventions

USAID/Malawi provides direct service delivery support for water and sanitation, malaria control, HIV/AIDS prevention, child spacing, and integrated maternal and child health care service delivery. For each, the USAID/Malawi role is described and evidence of program effectiveness is presented, together with observations.

Water Supply, Health Education, and Sanitation Promotion

USAID/Malawi's oldest health project is the provision of potable water through the construction of gravity-fed piped water schemes in rural areas. Hygiene education and sanitation promotion have been integrated into the water supply activities and the Promoting Health Interventions for Child Survival project calls for joint health and water activities conducted by the Ministry of Works and the Ministry of Health.

Program effectiveness can be measured in terms of the number of people with access to rural piped water schemes. Between 1980 and 1988, A.I.D. helped construct 18 piped water schemes reaching a population of 421,800 in over 1,400 villages. It is estimated that 25 percent of the rural population lives in areas suitable for piped water schemes and that currently about 19 percent of the population has access to piped water (Tyson).

92

the chloroquine-based interventions that have been tried to date have not had the desired impact, it is useful to review their effectiveness so that new interventions can benefit from lessons learned.

Since 1984, A.I.D. has been the primary donor to the malaria control program in Malawi, having contributed heavily to the 1985-1989 malaria control program. This program emphasized the use of chloroquine for malaria treatment and prophylaxis. A national malaria policy was established, and treatment and prophylaxis guidelines and chloroquine were made available in all health facilities. A 1986 evaluation of the Combating Childhood Communicable Diseases (CCCD) project confirmed that chloroquine was available in all health facilities. During its field visits, the CDIE team found that chloroquine was one of the few drugs consistently available, often in abundance.

Evidence is limited on how effectively the national treatment guidelines were implemented. According to the 1987 CCCD project annual report, all hospitals and facilities sampled were following the malaria treatment and prophylaxis policies. A comprehensive program review in 1989 determined that patient assessment (as observed) was correct in all cases and the signs and symptoms of malaria were well perceived. Because implementation at the client level was not monitored closely, it is not known whether proper chloroquine doses were consistently administered or the extent to which underdosing in facilities and the community may have contributed to the increase in parasite resistance.

Malaria research studies conducted between 1984 and 1990 contributed to policy and operational decision-making in the Ministry of Health. The most striking example of this contribution is reflected in the recent change from chloroquine to Fansidar as the first-line drug for malaria—a decision based on information generated through A.I.D.-supported research in Mangochi District.

Although chloroquine is readily available today, Fansidar is not. Implementation of the new malaria plan is just getting under way. It is anticipated that it will be at least 9 months before Fansidar will be made available at health facilities. The consequences of widespread Fansidar use are largely unknown. Effects of use during pregnancy are currently under investigation at the Mangochi Malaria Research Project. Malaria among pregnant women is a serious concern because of placental transmission and the increased risk of low birthweight infants to mothers with malaria. It is critical that Fansidar use be closely monitored for efficacy, adverse reactions, and potential development of parasite resistance.

The CDIE team noted that there is a certain complacency about malaria. Although malaria is the number one cause of outpatient visits, hospital admissions, and hospital deaths in nearly all age groups throughout the country, some health workers forget to mention it in interviews as an important health problem in their area, considering its existence as inevitable. Health workers recognize that chloroquine is ineffective, but have no alternative therapies to offer. An important part of introducing the new malaria policy will be revitalizing health worker motivation and sense of control in the battle against malaria.

Malaria control methods other than chemotherapy and prophylaxis are not being widely implemented. The United Nations International Children's Emergency Fund and at least one of the A.I.D.-supported private voluntary organizations (PVOs) are introducing insecticide-impregnated bed nets into their area-based child survival projects.

HIV/AIDS Control

The first case of AIDS in Malawi was diagnosed in 1985. Today it is estimated that nearly 10 percent of the population is infected with the human immunodeficiency virus (HIV). This rapid and severe epidemic is expected to take a serious toll on child survival rates.

A.I.D. is a major contributor to Malawi's National AIDS Control Program (NACP). Contributions are made annually through the Global Program on AIDS. A.I.D. also provides about \$500,000 worth of condoms annually for AIDS and sexually transmitting diseases prevention. In addition, the PHICS project, AIDS Communication Support project, Project HOPE/AIDS, and AIDS Technical Support Project provide technical support to NACP in the areas of AIDS in-service training for health workers, AIDS education in the schools, AIDS education for religious communities, and monitoring and surveillance activities, respectively. The Mission is also designing a large, new bilateral project with HIV/AIDS control as one of its major interventions.

The NACP program is relatively recent, now in its third year of implementation. Three areas can be reviewed for evidence of program effectiveness. First, has there been an increase in the population's awareness about AIDS? Second, has access to condoms increased? And third, has there been any change in sexual behavior?

Evidence suggests that the NACP project has effectively generated a widespread increase in AIDS awareness. AIDS posters can be seen throughout



the country, at health facilities, on public buildings, and in communities. During field visits, the CDIE team found that health workers consistently recited the signs, symptoms, modes of transmission, and preventive measures for HIV/AIDS. They appeared motivated to discuss HIV/AIDS with clients. Those who had attended the A.I.D.-sponsored short-term AIDS training courses were especially well versed and dedicated.

Distribution of condoms has increased dramatically in recent years. The number of A.I.D.-provided condoms used, sold, or distributed for AIDS prevention and child spacing increased from 200,000 to 3.7 million over just 1 year, from 1990 to 1991 (Atkinson undated). A problem with release of the AIDS-prevention condoms from the central medical stores delayed their distribution, but the problem has been resolved.

Since its launching in August 1991, the social marketing project has sold about 200,000 condoms, approximately 20 percent of the projected targets. Challenges encountered include a market flooded with free condoms and retailers and wholesalers who are reluctant to carry condoms for reasons related to profit or personal beliefs. However, the market research conducted as part of this effort provided important insights into behavior and attitudes of high-risk groups. The publicity campaigns have not only helped to encourage condom use but also have successfully won highest level policy support to promote publicly the use of condoms.

Statistics on actual condom use are scarce and are unavailable for high-risk groups. The 1991 SOMARC survey, which primarily looked at urban populations and considered condoms in terms of contraception rather than for disease prevention, showed an increase in current condom use from zero in 1984 to about 10 percent at the time of the survey. No other data have yet been collected on behavior change due to increasing AIDS knowledge and awareness. Anecdotal evidence suggests that prostitution in bars and guest houses has declined. A.I.D. is working with international experts to develop a feasible monitoring approach to measure such changes. This information is critical for determining the effectiveness of education strategies promoted to date and as input into decision-making about future NACP programming and A.I.D. assistance.

Child Spacing

Despite having one of the highest fertility rates in Africa, Malawi did not embrace child spacing as a health care intervention until 1984. A.I.D. is a major donor for child spacing—in contraceptive supply, computer modeling, and policy

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dialogue, voluntary surgical contraception, and a new community-based distribution pilot project.

Child spacing efforts have increased over recent years, but the program is still very new. Data are available to review progress in health-worker training, the number of facilities providing child spacing services, and contraceptive distribution. Data on contraceptive prevalence are limited.

With A.I.D. support, over 900 health workers have been trained as child spacing service providers. One Ministry of Health official informed the team that because of staff transfers and other changes, only about 500 of these trained workers are actually providing child spacing services at this time.

The number of health facilities offering child spacing services has climbed from 1 in 1984 to 210 in 1991 (API undated). Based on a recent inventory, contraceptive supply in these facilities no longer appears to be a program constraint. Still, less than one-third of Malawi's 748 health facilities offer child spacing services.

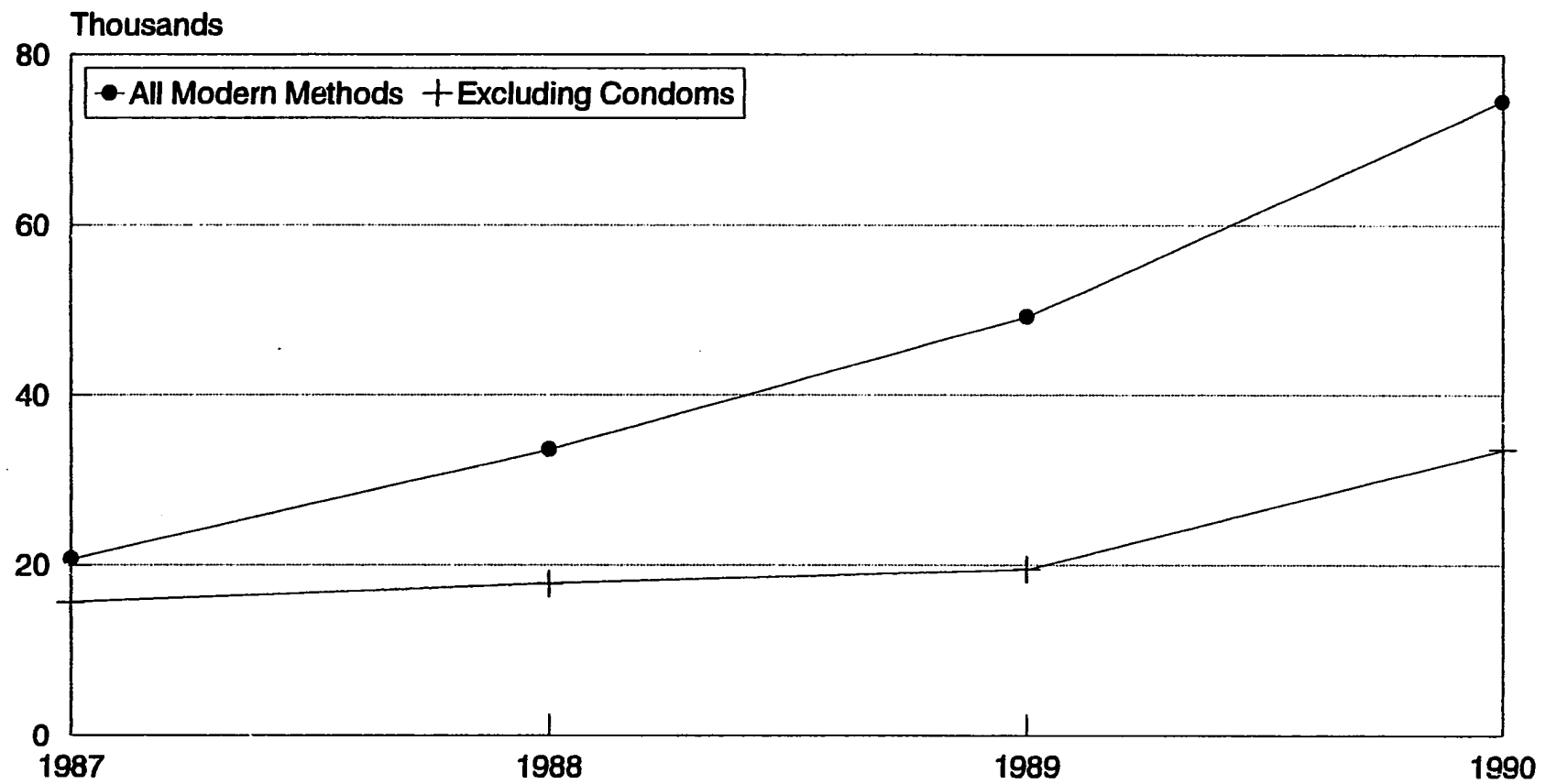
In terms of contraceptive use there has been no nationally representative survey since the 1984 Family Formation Survey, which revealed a contraceptive prevalence rate of 1 percent. As shown in the figure, routine reports through the national health information system indicate a modest, but steady and accelerating, increase in the annual number of new acceptors between 1986 and 1990. With A.I.D. support, voluntary surgical contraception has increased from 0 in 1984 to over 1,200 in 1991. The 1991 SOMARC survey indicates that contraceptive prevalence may have increased to as high as 10 percent in urban areas. Better data will be available later this year after the A.I.D.-supported Demographic and Health Survey has been completed.

Despite some signs of progress, contraceptive prevalence has remained low with a heavy reliance on traditional child spacing methods. Fertility remains high and there is little evidence to suggest that high-risk fertility behavior is declining.

There are several constraints to the current child spacing program in Malawi. Health officials frequently mentioned that the duration and rigor of the 3-month child spacing provider training constrain effective service delivery. Certain practices in service provision are also perceived by health workers as hampering child spacing acceptance. For example, (1) depo provera is not provided to women under the age of 35 years, (2) nulliparous women are not

87

New Contraceptive Acceptors Malawi 1987-1990



Source: Ministry of Health/HIS

eligible to receive child spacing services, and (3) all women are required to undergo a full physical and internal exam before receiving child spacing methods and to return to the clinic 6 weeks after their first visit for followup.

In terms of demand for child spacing services, surveys have indicated that women desire fewer children than the current national average. However, it is not yet clear whether this is an educated or an operational demand. At one district hospital visited, despite the presence of child spacing providers and students in practical training, the availability of all methods, and the provision of regular health education and motivational talks at the integrated clinic, child spacing acceptance has remained relatively constant since 1989. Although women may understand and accept reasons for spacing their children and for having fewer, it is not clear whether they understand how to space births or whether they are sufficiently motivated to obtain services or overcome social, cultural, and health care system obstacles that may exist.

A.I.D. assistance to promote policy dialogue on the important role of population in development has facilitated discussions about child spacing. Over the last year, the population policy climate in Malawi has warmed notably. A National Family Welfare Council to coordinate all child spacing activities has been approved by the Life President and Parliament. A.I.D. has been a strong contributor to the establishment of this coordinating body. A workshop for principal secretaries late last year recommended eliminating many restrictions to child spacing method provision. The Ministry of Health is considering the feasibility of reducing and simplifying the child spacing training program. The ability to insert intrauterine devices as a requirement for graduation has already been eliminated. These and other developments are encouraging and may lead to the more rapid expansion of child spacing acceptance in the near future.

Integrated Maternal and Child Health and Under-5 Services

Health facilities. Improved, institutionalized delivery of integrated health services is the ultimate goal of USAID/Malawi's capacity-building efforts. About 1 year ago, the Ministry of Health changed from a strategy of providing different clinical services on different days of the week to providing integrated services everyday. These "integrated clinics" include immunization, oral rehydration therapy, outpatient treatment of minor childhood illnesses, and growth monitoring and child spacing where trained providers are available. Each clinic begins with a health education talk.

Without 1991 data on service delivery, it is difficult to assess the status of implementation or performance of these clinics at this time. Members of the

- 89 -

team observed integrated clinics during field visits. The major advantage appeared to be the comprehensive handling of mother and child. That is, vaccinations are administered to children brought in for minor illnesses, and the mother's presence affords an opportunity to provide other services and information. For example, one woman who was at a clinic for a followup child spacing visit reported that she learned about child spacing when she brought her child to the integrated clinic for vaccinations.

The major constraints faced by these clinics appear to be the patient load relative to the staff, drugs, and supplies available. At one health center visited, 150-200 patients a day are seen by a medical assistant. His only supplies on hand were aspirin, chloroquine, and condoms. No dressings, bandages, antibiotics, or other drugs were available. The integrated clinic at Mangochi District Hospital sees an average of 300 patients a day. The district's annual budget translates into 61 tambala per capita. A curative dose of chloroquine costs about 30 tambal. Queen Elizabeth Central Hospital, the country's largest hospital, sees about 700 children daily for under-5 clinics. Under these circumstances, health care services are stretched to the point where quality suffers. Waiting times are extended, treatments are unavailable, and many health workers complain about not being able to spend enough time with their patients and clients.

PVO support. A.I.D. direct support to integrated services delivery began in 1986 with a centrally funded child survival grant to Save the Children Federation in Mbalachandra in conjunction with the Malawi Rural Development Linkage project. Although there is limited information available, that project's successes led to the award of a follow-on grant to expand the project to a new geographic location. The second-stage project is in the early stages of implementation.

Including Save the Children Federation, there are now five A.I.D.-supported PVOs delivering integrated maternal and child care services at the community level in different geographic regions of the country. Each has just completed a baseline survey, and although there have been delays in data analysis, the findings will provide a solid basis for future reviews of program effectiveness. The five PVOs are trying new and different approaches. For example, Project Hope is working with private tea estates to improve service delivery for employees and their dependents. The International Eye Foundation has led the way to introducing vitamin A as a basic preventive health intervention. World Vision and the Adventist Development and Relief Agency are also implementing integrated projects. All five PVOs are experimenting with different training approaches, job descriptions, and motivational strategies for

village health volunteers (VHVs) and health surveillance assistants (HSAs). PVO experience in these areas should prove useful to larger efforts undertaken by the Ministry of Health, the PHICS project, and other donors.

The PHICS project. A.I.D.'s PHICS project has a service delivery component; its primary objective is to demonstrate through large-scale field tests and health-systems research cost-effective, replicable ways of delivering child survival services at the community level. Unfortunately, these activities have not yet been initiated. A baseline survey was conducted in October 1991, but the data have not yet been analyzed because of administrative complications between A.I.D. and the Ministry of Health. Another constraint has been that responsibility for this component of the project rests in the child spacing unit. This unit has recently had personnel turnover and is stretched in its dealings with seven different donors for child spacing. In order for the PHICS project's capacity-building efforts to be translated into measurable improvements in service delivery, it is essential that this component of the project move forward.

Specific Findings on Capacity-Building Efforts

As noted above, a large portion of the A.I.D. health portfolio is devoted to capacity building to strengthen and improve the systems through which child survival interventions are provided. These efforts are primarily implemented through the PHICS project. Complementing PHICS activities, but not explored in depth in this review, are the Human Resources and Institutional Development project, which focuses on long-term training and management capacity, and the Services for Health, Agriculture, and Rural Enterprise Development project, which focuses on nongovernmental capacities in health and other sectors. The five PVO child survival projects work in targeted geographic areas to develop the capacities of communities, Ministry of Health offices, and private organizations to strengthen the primary health care delivery system.

Also as noted earlier, capacity-building efforts are long-term investments. In anticipation of longer term, more sustainable benefits, early impact may be sacrificed while the focus is on system strengthening. This is an example of where sustainability and effectiveness may conflict in the early phases of a project with the expectation that results in later years will be more effective and more sustainable. USAID/Malawi's current portfolio of capacity-building efforts is quite new. Activities under PHICS started in earnest only over the past 2 years. Much of the activity to date has focused on recruitment of personnel and procurement of equipment and supplies. It is, therefore, too early to comprehensively review the effectiveness of capacity-building efforts.

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In this section, some of the broad areas in which A.I.D. is working to build capacity are reviewed. The review is not exhaustive; it focuses on four cross-cutting areas in which more information was available to the team: training, planning, information, and communication. The intent of this section is to describe—in general terms—the nature, accomplishments, and issues of capacity-building efforts made to date.

Training

Training is a key component of the USAID/Malawi approach to capacity building. A significant number of health care personnel have received training (preservice and in-service) through A.I.D. assistance. Because of time and data constraints, the CDIE team was unable to assess whether this training has led to improved quality and better coverage of service provision. However, the team did explore the level and types of training being undertaken with A.I.D. support.

Health surveillance assistants. The central element of training provided by A.I.D. is preservice training for HSAs, the first-line health workers in Malawi. Known in the 1970s as cholera assistants, these health workers have assignments in preventive and basic health services and information collection. They serve as the primary point of contact between the health care system and the community. HSAs are widely viewed as critical links in the chain of health care services delivery.

The objective of A.I.D. support is to increase the total number of trained HSAs from its current level of 500 to 4,000. This would result in a ratio of 1 HSA for every 2,000 people, eightfold better than it is today.

Despite some delays, the HSA training coordination function has been established within the Ministry of Health. A long-term curriculum development advisor has been recruited to assist with HSA and other paramedical training. Twenty district health personnel have been trained as HSA trainers. During early 1992, the first round of PHICS-supported HSA training was conducted. Approximately 170 HSAs were trained in 5 centers around the country. These HSAs are now on the job in their respective districts.

While in the field, the CDIE team met one newly trained HSA. She was quite satisfied with the training and seemed to understand her basic areas of responsibility. It is important to note that another objective of A.I.D.'s support is to increase the number of female HSAs. Because this field traditionally has

92

been dominated by males, and much of the HSAs' work relates to mothers and children, A.I.D. hopes to create a situation in which the HSA cadre is divided evenly between men and women.

The senior HSAs are a most impressive group. Those the team met and interviewed knew their responsibilities and communities extremely well. Much of this expertise seems to have been acquired on the job and in association with local health facilities.

Although reviews of the 6-week training were favorable, most felt that practical knowledge of all job components could not be absorbed within the time allowed. The training provides an orientation to the work and reference materials, but the HSAs' success depends largely on practical and interpersonal skills developed through experience.

At one facility the team visited, a newly trained HSA was paired with a senior HSA who had been on the job for 10 years. This form of "mentorship" seemed to be an excellent approach for instilling confidence and expertise in the new HSA.

Most HSAs in the districts work closely with VHVs. Some VHVs have a single task focus (e.g., growth monitoring), whereas others have a broad range of duties. The working relationship between HSAs and VHVs also varies in terms of its proximity and content. In all cases however, HSAs and VHVs spoke favorably about their relationships. It seems appropriate that decision-making about the VHV role and the relationship between HSAs and VHVs has been left to the local level where VHVs are actually trained and where working conditions and health-care-system needs may vary.

The five A.I.D.-supported PVOs are also working with HSAs and VHVs. Different training and supervision strategies are being tried. Issues of VHV motivation and sustainability are being explored. PVOs have established a coordination mechanism and are beginning to share experiences in this regard. Information on PVO successes and failures should prove very useful to the Ministry of Health and A.I.D.

Paramedical training at the Lilongwe School of Health Sciences. Through the PHICS project, A.I.D. is currently completing in-service training support activities begun in 1984 under the Health Institution Development project. Three paramedical courses have been introduced and include family health and primary health care, child spacing, and HIV/AIDS.

93

Faculty members have been trained to conduct all three in-service training programs. With A.I.D. support, all of the approximately 170 trained health assistants in the country are receiving in-service training using a newly revised curriculum that incorporates family health and primary health care. Of the targeted 2,500 health workers, over 900 have been trained in child spacing. A.I.D. has also supported in-service training of over 800 health workers in HIV/AIDS control.

The Ministry of Health and A.I.D. recognize the need for a longer term, more comprehensive solution to the problems of low intake capacities and fragmented and uncoordinated training. As a result, A.I.D. is supporting the establishment of a Manpower Development Unit in the Ministry of Health, discussed in greater detail below.

Planning

A.I.D. is assisting in a variety of ways to improve planning for the delivery of health services. The centerpiece of this assistance is the establishment of a Manpower Development Unit within the Ministry of Health. At a lower level of operation, PHICS requires all of the Ministry of Health units involved in the project to prepare annual workplans. This requirement is attached to the budget allocation process and is intended to rationalize and organize project implementation activities.

The Manpower Development Unit. As noted above, the greatest constraint to the delivery of health care services in Malawi is the shortage of trained personnel. Through training and support activities, A.I.D. has a long history of assisting with the personnel problem. In an effort to provide long-term and comprehensive resolution of this constraint, A.I.D. recently became the primary donor to support the establishment of a Manpower Development Unit in the Ministry of Health. The highest priority for this unit is the preparation of a comprehensive personnel development plan. Plan components will include career structure enhancement, rationalization of long- and short-term training, and the establishment of an integrated in-service training program.

After much high-level negotiation, the Manpower Development Unit was established on paper in February 1991 and a budget was made available. Key people, including a long-term technical advisor and two Ministry of Health officials, were in place as of about 6 months ago.

Data collection activities for the development of the personnel plan have been initiated. In particular, Manpower Development Unit staff have begun

- 94 -

tracking training activities, including overseas training opportunities and those of the Lilongwe School of Health Sciences and the Private Hospital Association of Malawi. Completion of the plan will be the first time such information is available in a systematic manner. As described by one Manpower Development Unit official, this information will give the Ministry of Health the capacity to rationalize training and develop a training plan to which donors can respond.

This unit is still in formation. Broad objectives for the unit are understood, but details of implementation and operation are still being sorted out. Delays in the Ministry of Health personnel recruitment and A.I.D. computer procurement have hampered progress to date.

Annual workplans. As part of the PHICS project budget allocation process, every unit receiving project funds is required to prepare an annual workplan outlining and scheduling major activities. These workplans are submitted to the PHICS coordinator, who compiles them into one project-level workplan. The workplans are approved by the controller before being submitted to A.I.D. Any controversial items are negotiated between A.I.D. and the Ministry of Health until a consensus document is produced.

The team's visit to Malawi came at the end of the Government's fiscal year (FY). As a result, all of the units with which the team met were in the process of developing their FY 1992/93 workplans. Each unit was able to display its FY 1991/92 workplan as well.

The process of workplan development was viewed favorably for the most part by all unit staff. Advantages of the workplan process include a sense of ownership on the part of the Ministry of Health. Individual workplans also serve as contracts by which all parties understand what has been agreed to.

Another advantage of these workplans is that the Ministry of Health decides when and why to have external technical assistance. This helps to ensure that each PHICS-supported international consultancy is maximized.

The workplan can be a management burden, especially if several donors require the same unit to produce plans tailored to respective donor-supported activities. One solution, undertaken by the Health Education Unit, is to prepare one workplan incorporating the requirements of all donors to that unit. Planning requirements will be less likely to overwhelm program implementation if both donors and host country officials work together to identify and agree on less cumbersome and complex planning tools.

95

None of the units interviewed had been able fully to implement its FY 1991/92 workplan. Several reasons were cited for this, including delays in the Ministry of Health and A.I.D. recruitment, complications and delays in the procurement of equipment and technical assistance, and a feeling that initial workplans may have been overambitious.

The fact that PHICS is fully integrated into the Ministry of Health bureaucracy has added to the length and complexity of its startup. The important advantage of working within the Ministry of Health administrative structure relates to the Ministry of Health ownership and sustainability. However, in some instances, it seemed to the team that effectiveness could be augmented at a limited cost to sustainability by having a small, easily accessible budget allocation for responding to unexpected constraints and targets of opportunity. For example, analysis of the baseline survey conducted in Dedza has been delayed by over 6 months. Local assistance might have been employed to complete this analysis while a longer term mechanism was established for future surveys. This would have helped to get the service delivery component of PHICS off the ground.

Information

A.I.D. is assisting the Ministry of Health to improve the availability of information by strengthening three areas in the Ministry of Health: research, epidemiology, and health information. This analysis focuses on research activities.

Research. Since 1984, A.I.D. has supported the Ministry of Health in conducting operational research, especially in the area of malaria control. Over the years, A.I.D. support has evolved from the support of individual research activities to broader support for the institutionalization of a Malawian health research infrastructure. Through the PHICS project, A.I.D. supports two major endeavors—strengthening the Ministry of Health's Research Unit and the expansion of malaria research activities into a national field research station in Mangochi District.

The Ministry of Health Research Unit. In 1988, a research unit was established within the Ministry of Health. The objective of this unit is to support (technically and financially) research that is policy and action oriented. The objective of PHICS support is to ensure that the unit develops the capacity to coordinate all research activities within the Ministry of Health, from the identification of topics through the review and approval, implementation, data analysis, and channeling of findings back into the Ministry of Health policy, planning, and programming processes.

96

To date, the Research Unit has demonstrated the capacity to produce quality, relevant research proposals locally. Three five-member teams of investigators have been trained. Proposals from each team have been approved and research activity will begin soon. The three topics to be studied are very relevant and timely:

- Factors leading to low utilization of child spacing methods in the Southern Region
- Factors leading to inactivity of village health committees in the Northern Region
- The impact of growth monitoring on the nutritional status of under-5-year-old children in the Central Region

In addition, a long-term documentation specialist is being supported through PHICS while the Ministry of Health librarian is in Botswana for further studies. Computer equipment, supplies, and services have been provided, including desktop publishing hardware and software and access to international medical data bases.

A computerized system for tracking and cataloguing research is being established. During the team's visit, the unit produced "A Select Bibliography of Health Information in Malawi: 1980-1991." This is the first time that a major sample of the materials related to health and medical care in Malawi has been accessible in a systematic manner.

The Research Unit appears to be off to a very strong start. The true litmus test for the unit will come 1 year from now when the research findings of the first three studies are available for use in decision-making.

Malaria research and the proposed field research station. Beginning in 1984 with assistance from the Centers for Disease Control under the CCCD project, A.I.D. has supported numerous operational research activities, especially in the area of malaria control. Most of this activity has occurred in Mangochi District. With a current amendment to the PHICS project, A.I.D. will expand this activity and assist in the establishment of a field research station to address critical health issues.

A.I.D.-sponsored research activities in Malawi have made significant contributions to the understanding of malaria worldwide, as well as locally. Research in Mangochi helped document the prevalence of chloroquine resistance. Based on this research, the Ministry of Health developed a revised malaria policy and plan in 1991, recommending that Fansidar replace chloroquine as the first-line drug of choice. Malawi is the first country in Africa to make this decision.


These research activities have confirmed the importance of establishing a Malawian research center to address health issues of local importance.

Communication

Both the Ministry of Health and A.I.D. are committed to improving information, education, and communication activities. The Ministry of Health introduced a national health education policy in 1988. Through the PHICS project, A.I.D. supports the Health Education Unit in its efforts to implement this policy. The intent of A.I.D. support is to ensure that the Health Education Unit can efficiently produce or arrange for the production of a variety of health education materials and messages in response to requests from the Ministry of Health and other government clients. First through the Health Communications project, and now through PHICS, A.I.D. has also supported the research, pretesting, and production of many child-survival-related health education materials.

Plans are now being made to develop a career structure in health education. Recruitment is under way for the employment of 31 additional staff, including 1 health educator for each of the 24 districts, 1 for each region and 3 additional for the central office. A.I.D. has also provided graphics equipment and supplies. A committee structure that involves program managers as well as senior Ministry officials has been established to ensure that health education activities are prioritized and coordinated.

Although PHICS support is intended to allow the Health Education Unit to respond to all programs, there is concern among some managers that programs with additional funding, such as AIDS control, are receiving a disproportionate amount of the Health Education Unit's time. However, other managers feel that the Health Education Unit is quite responsive to any request. There seemed to be a lack of awareness on the part of some program managers that requests can be made without additional funding. General communication on this point and the Health Education Unit's policies would help end some of the confusion.



APPENDIX C

INFANT AND CHILD MORTALITY AND MORBIDITY IN MALAWI

Mortality Comparisons With Other Countries

Assessment Issue:

What are our best estimates of changes in child morbidity and mortality over the past several decades? If, in fact, there has been a reduction in the decline of morbidity and mortality in recent years, what are the possible explanations? And what are the implications for future programs?

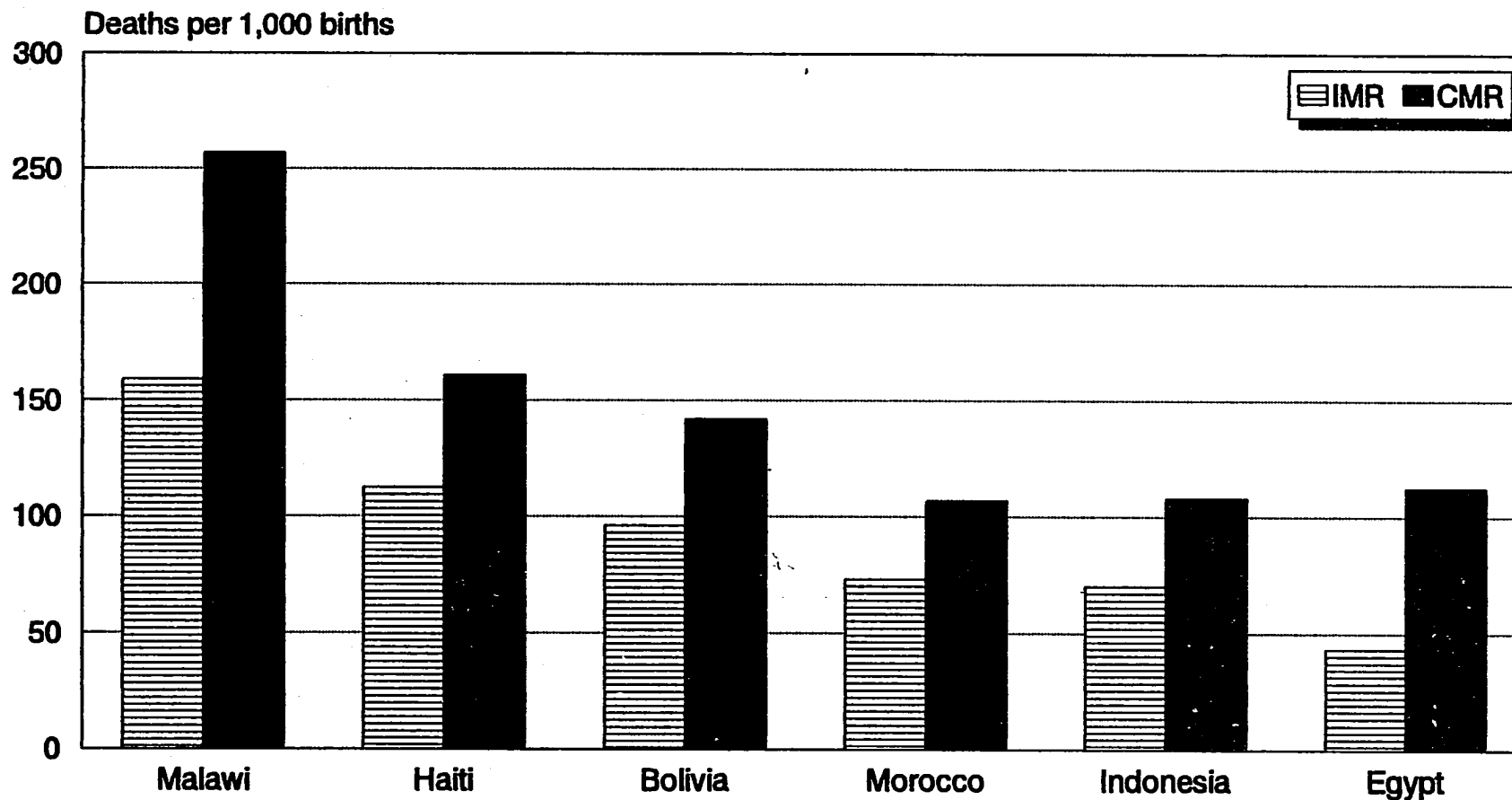
Among the six countries included as case studies for the Center for Development Information and Evaluation (CDIE) child survival assessment, Malawi has the highest rates of infant and child (under age 5) mortality. Malawi's mortality rates of 159 for infant mortality and 257 for child mortality are more than double those of three of the other five countries (Figure C.1). These rates are high also relative to those of other countries in East and Southern Africa (Figure C.2).

Geographic Variation Within Malawi

There is considerable variation in infant mortality by geographic area within Malawi. In 1987 the Central Region had the highest infant mortality rate of 171, followed by the Southern Region with 156, and the Northern Region with 133. Although districts within the Northern Region have consistently lower infant mortality compared with those in the rest of the country, there is considerable

99

Figure C.1
Infant and Child Mortality Rates
Among the Six CDIE Assessment Countries

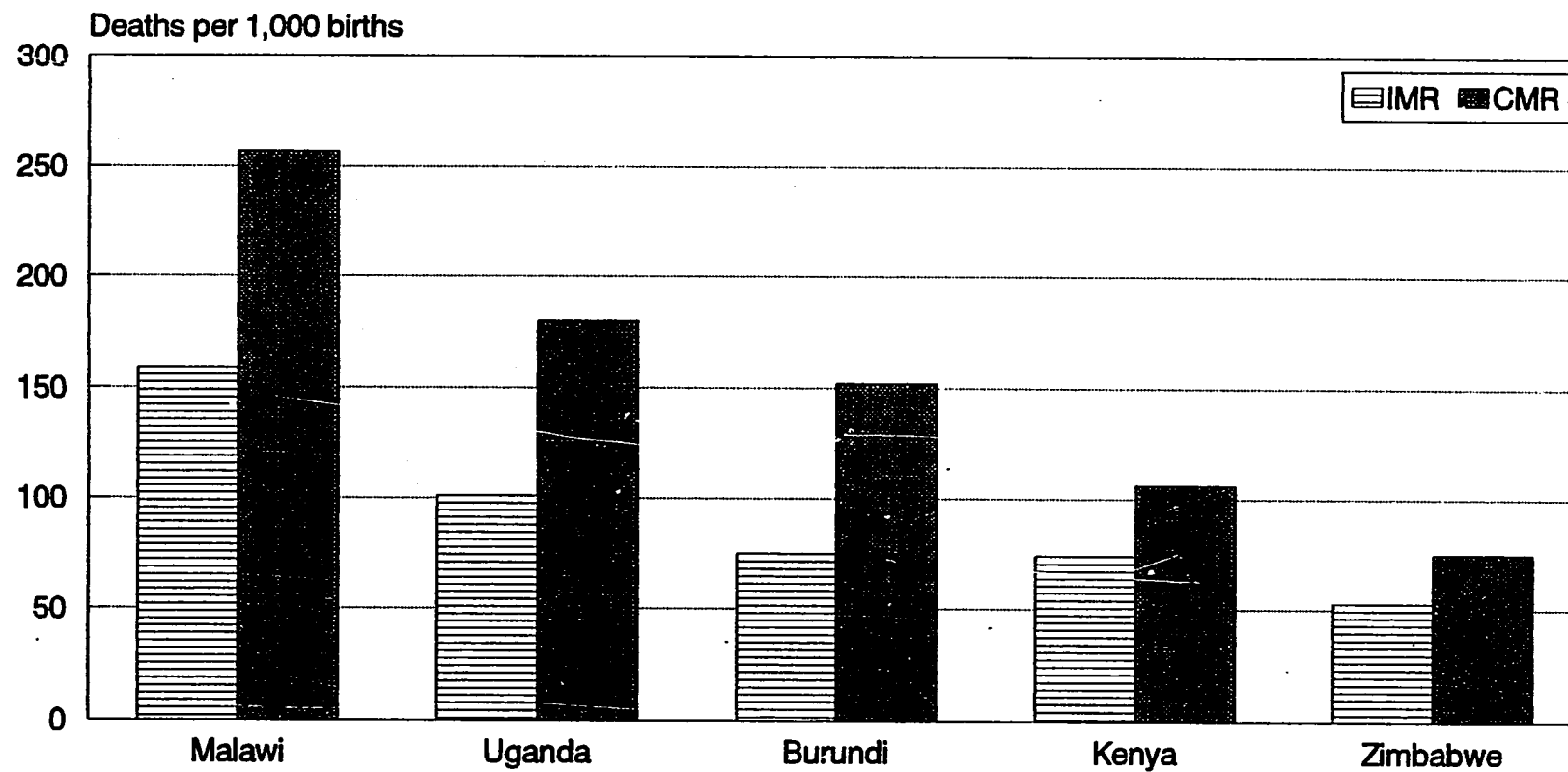


Source: CDIE/Child Survival Evaluation Series.

Note: CMR = child mortality rate; IMR = infant mortality rate

201

Figure C.2
Infant and Child Mortality Rates
Among Other Countries in the Region



Source: 1987 Census (Malawi) and Demographic and Health Survey.
 Note: CMR = child mortality rate; IMR = infant mortality rate

variation among districts in the Southern Region. There, infant mortality rates range from 121 in Blantyre to the highest district rate in the country of 191 in southernmost Nsanje.

Mortality Changes Over Time

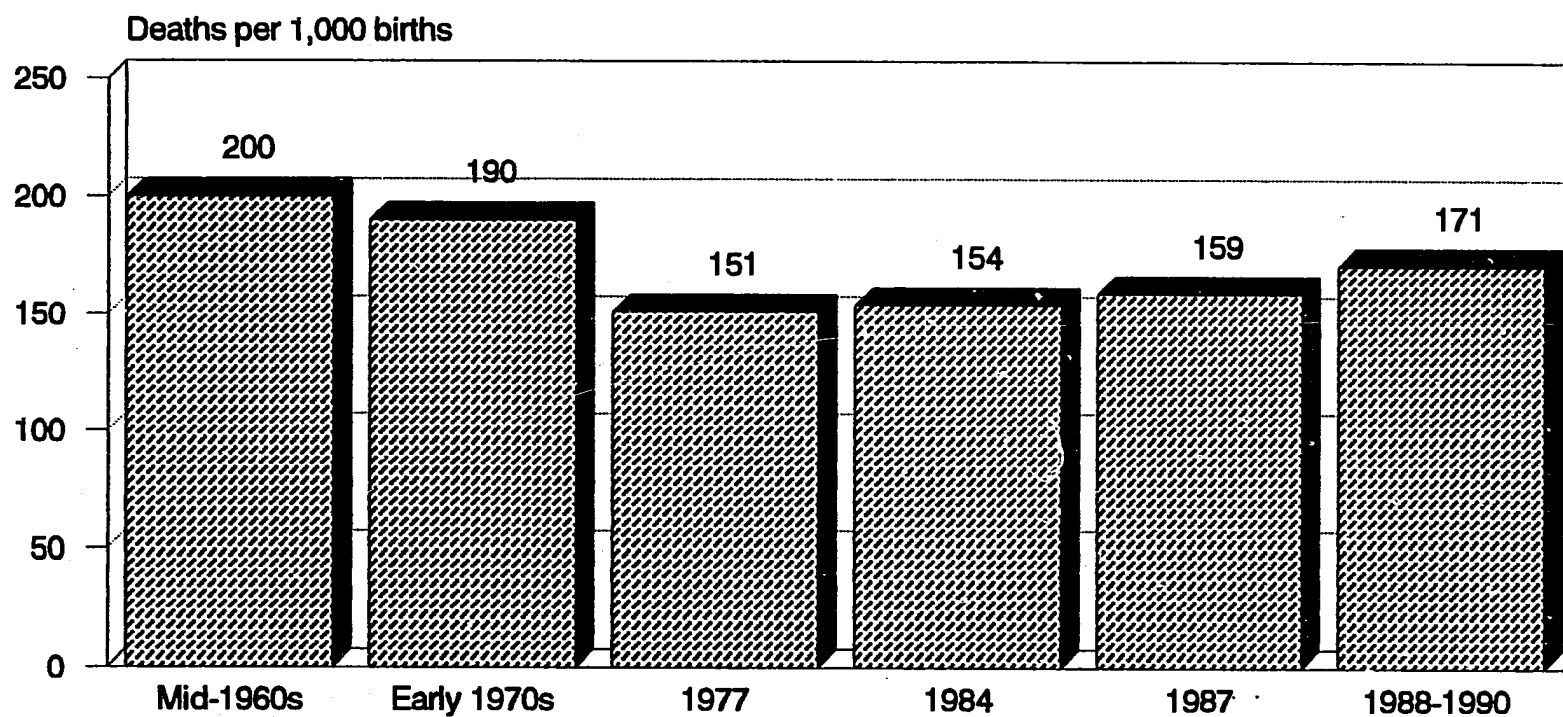
Because Malawi does not have a vital registration system, estimates of infant and child mortality are obtained from censuses, sample surveys, and demographic projections. Because different methodologies have been employed to make these estimates from a variety of data sources, comparisons over time must be made with some caution. Nevertheless, with the recent release of the 1987 census estimates, it is quite certain that infant and child mortality rates at the national level have not been declining over the past decade at the rate seen in the 1960s and 1970s. The 1987 census national estimate and a recent survey estimate from Mangochi suggest that infant mortality is, in fact, increasing (Figure C.3).

Examination of data on district-level infant mortality rates from the 1977 and 1987 censuses yields a somewhat different picture. These data indicate that within each district (with the exception of Mchinji), infant mortality rates have declined. It appears that district-level estimates are not necessarily compatible with national-level estimates. The 1987 rates were obtained from the 1987 Census Summary of Final Results. The 1977 rates were calculated by United Nations International Children's Emergency Fund (UNICEF) using the 1977 census and the same methodology as that used to calculate the 1987 rates (UNICEF n.d.). The 1984 Family Formation Survey's district estimates provide no further information to help sort out the discrepancy. In fact, they show no correlation with either the 1977 or the 1987 estimates. This variation suggests that estimation of the infant mortality rate is sensitive to the methodology employed and that trends in mortality rates should, therefore, be interpreted with caution.

The primary reason cited for the slowing decline in mortality is the increasing incidence of chloroquine-resistant malaria beginning in the early 1980s. Progress in combating common childhood diseases through immunization and diarrheal diseases control has been offset by the growing malaria problem. Unfortunately, the toll of malaria on child survival is not anticipated to disappear in the near future. Immediate, effective solutions are not in sight, in spite of Malawi's leadership in research on malaria epidemiology and treatment. Chances of significant improvements in child survival have been further complicated by the advent of the AIDS epidemic. The impact of AIDS on child survival is just now beginning to be observed and although no one can predict with certainty the

102

Figure C.3
Trends in Infant Mortality
Rates in Malawi



Source: 1977, Census; 1984, Family Formation Survey; 1987, Census; 1988-1990, Mangochi Malaria Research Project.

103

magnitude of its effect on child survival, its impact is certain to be felt over the next decade.

Causes of Inpatient Deaths

An estimated 25 percent of deaths in children under age 5 occur in the first month of life, 25 percent occur in the second through twelfth months, and 50 percent occur in the first through fourth years (1984 Family Formation Survey).

In 1990, approximately 9,500 child deaths were reported nationally from hospitals and health centers with inpatient facilities, representing 54 percent of all inpatient deaths. The absence of a vital registration system prevents a comprehensive assessment of causes of morbidity and mortality and limits the ability to generalize to the population at large. Additionally, health facility reporting is often incomplete and inconsistent from year to year. Nevertheless, the health information system provides valuable insight into disease prevalence and changing disease patterns and is the primary source of data for the following analysis.

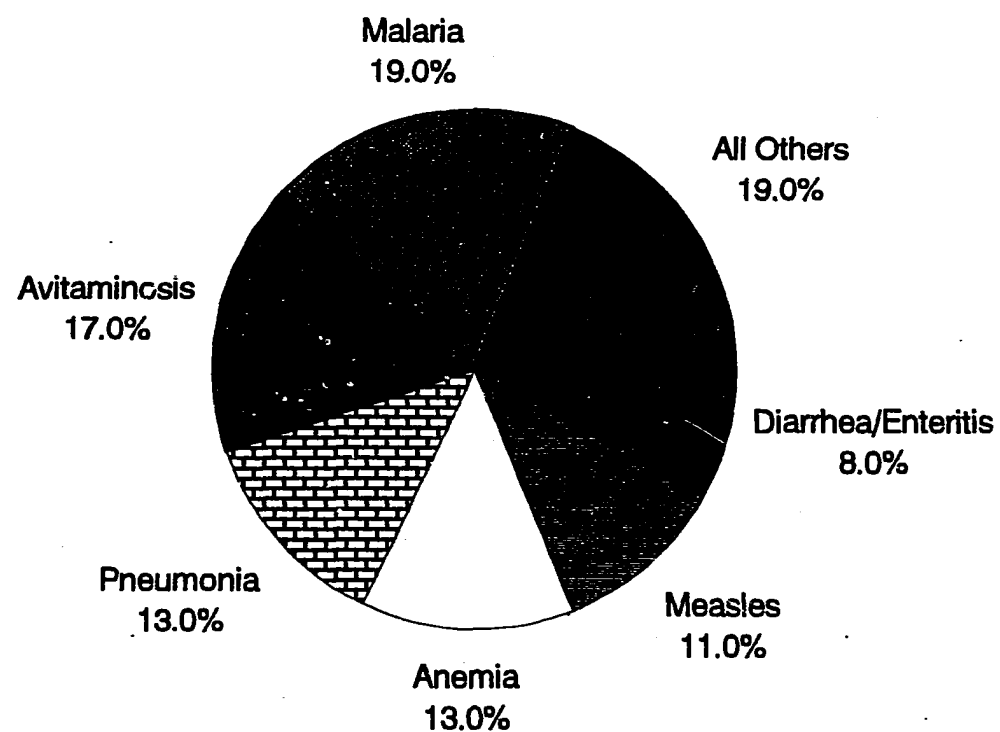
The most prevalent disease among all age groups of the population is malaria and it is the number-one cause of morbidity and mortality among children. In 1990, malaria accounted for 19 percent of all child deaths. Anemia, very highly associated with malaria, accounted for 13 percent of mortality in children, and together malaria and anemia represented 32 percent of all child deaths. The second leading cause of mortality was avitaminosis, accounting for 17 percent of all child mortality. Pneumonia was responsible for 13 percent of child deaths, measles 11 percent, and diarrheal diseases 8 percent (Figure C.4).

Trends in Causes of Mortality

Because of yearly fluctuations in reporting coverage from the health information system, accurate comparisons of the number of deaths by cause over time cannot be made. It is possible, however, to examine the distribution of deaths by cause within given years and to make comparisons across years. Data for children under age 5 are available from the health information system beginning in 1985. These statistics indicate that the pattern of childhood diseases *has* changed rather dramatically since the mid-1980s. Of particular importance is the increase in child mortality from malaria, going from 11 percent of child deaths in 1985 to 19 percent in 1990. The percentage of deaths from malaria-related anemia has remained fairly constant (Figure C.5). The proportions of

104

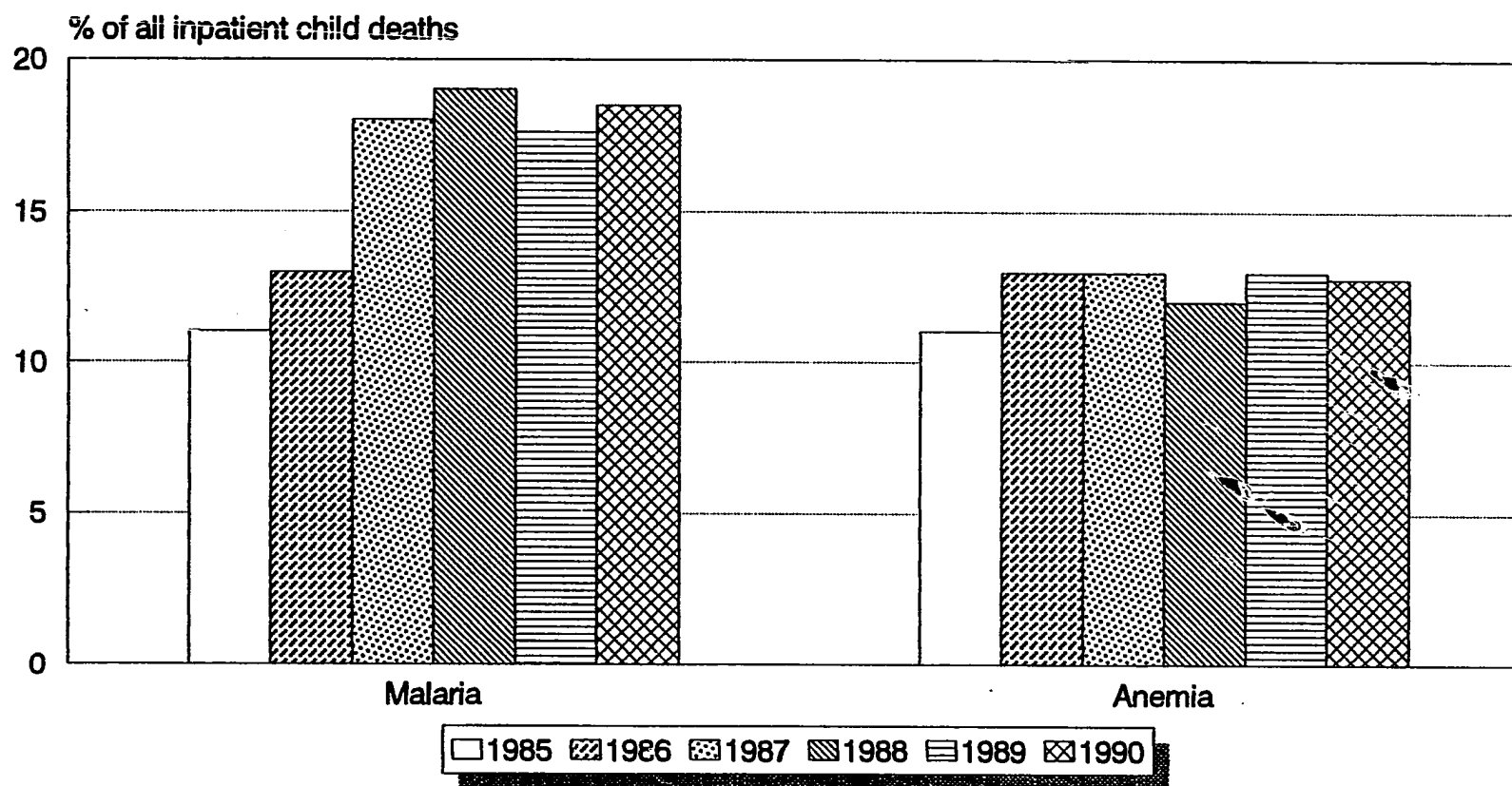
Figure C.4
Distribution of Child Deaths by Cause
(inpatient deaths of children under 5)
1990



Source: Ministry of Health/HIS

2/21

Figure C.5
Trends in Child Mortality
Due to Malaria and Anemia



Source: Ministry of Health/HIS

106

deaths due to avitaminosis and to pneumonia have also shown little change, while measles has shown a sporadic decline. Diarrheal diseases have shown no consistent trend (Figure C.6).

Major Disease Categories of Child Morbidity

In 1990, malaria and anemia together accounted for over 43 percent of child hospitalizations, followed by acute respiratory infections, diarrheal diseases, nutritional deficiencies, and measles. The pattern of childhood diseases serious enough to require hospitalization appears to have remained fairly stable over the past 6 years with the exception of hospitalizations for malaria and measles. The percentage for malaria has increased steadily from about 20 percent of all hospitalizations in 1985 to about 30 percent in 1990. The percentage of hospitalizations for measles has fallen from about 15 percent in 1985 to less than 10 percent in all subsequent years except 1987.

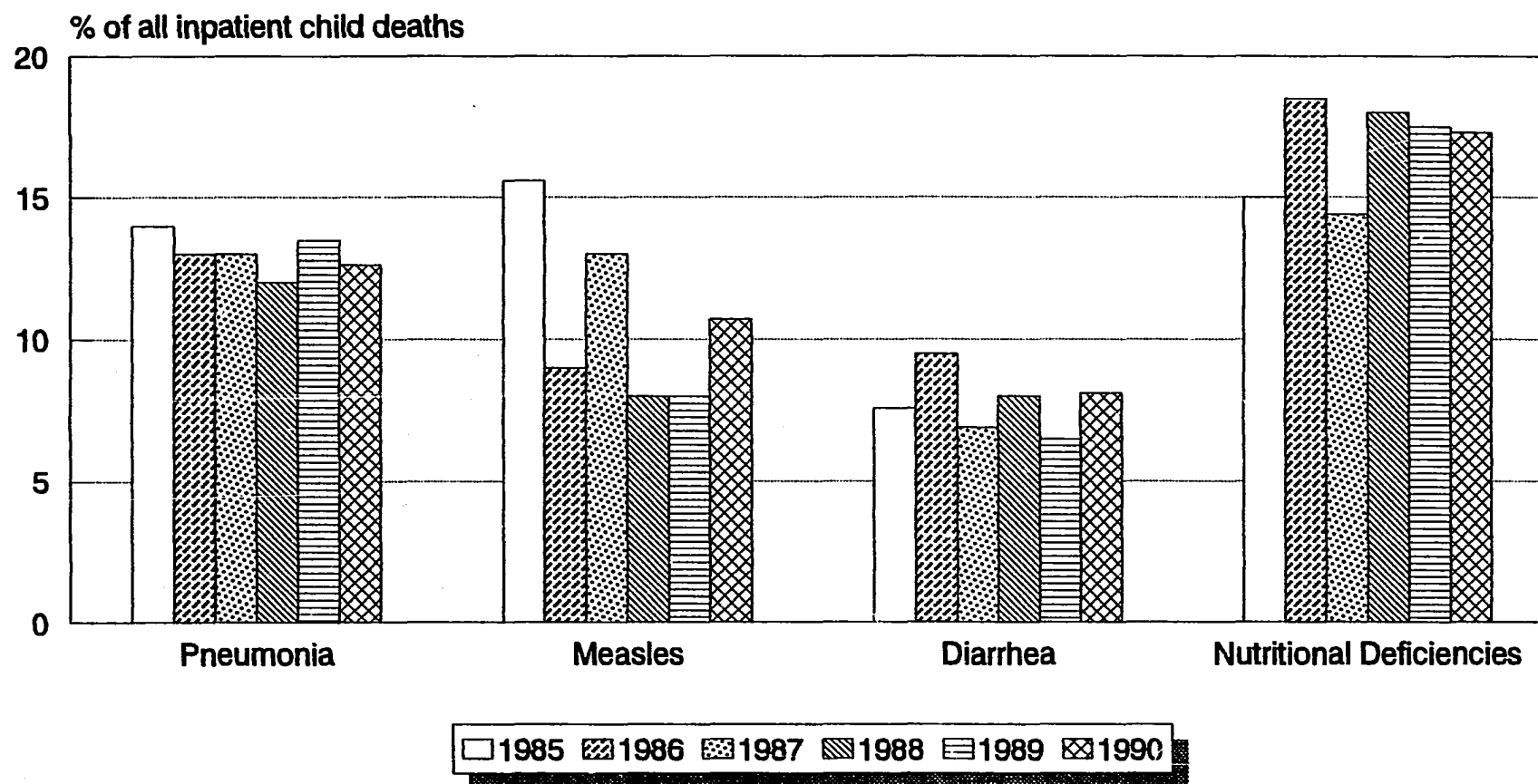
Malaria is also the most frequently seen disease among children coming to outpatient clinics. Over one-third of child outpatient attendances in 1990 were for malaria, followed by respiratory illnesses, which were the cause of 19 percent of all visits. Diarrheal, eye, and skin diseases were the next most prevalent conditions, each representing 6 percent of child attendances. Like hospitalizations, the pattern of childhood diseases seen at outpatient clinics has remained fairly stable, with the exception of malaria, which has been increasing since 1987. Diarrheal diseases have shown a slight decline since 1985.

Malaria

Malaria contributes to mortality in three distinct ways: (1) by causing acute fever illness, which progresses to severe disease and death, (2) by causing chronic debilitation characterized by anemia and malnutrition, which leads to death or contributes to other infectious agents causing death, and (3) by causing placental infection in pregnancy leading to low birthweight, which is the most important risk factor for neonatal mortality. Even with appropriate care, the case fatality rate for cerebral malaria is about 30 percent for children under age 5.

Before 1980, malaria control activities included case management through health facilities and chemoprophylaxis (primarily chloroquine) for pregnant women and children attending clinics. In the early 1980s it was observed that some malaria cases were failing to respond to chloroquine treatment and in 1984 chloroquine resistant strains of malaria were confirmed. Attempts to treat and

Figure C.6
Trends in Leading Causes
of Child Mortality



Source: Ministry of Health/HIS

108

prevent malaria through the end of the 1980s have been inadequate. It has been demonstrated that chloroquine prophylaxis is of limited benefit in preventing malaria in pregnancy and that chloroquine can no longer be relied upon to treat severe infection. The Ministry of Health has developed a second 5-year plan (1990-1994), which, among other objectives, emphasizes the importance of mothers recognizing febrile illness in children, and prompt treatment. In 1991, upon review of the situation, the Ministry of Health decided to replace chloroquine with Fansidar as the first-line drug of choice. This policy is currently in the initial stages of implementation and Fansidar is not yet readily available at health facilities.

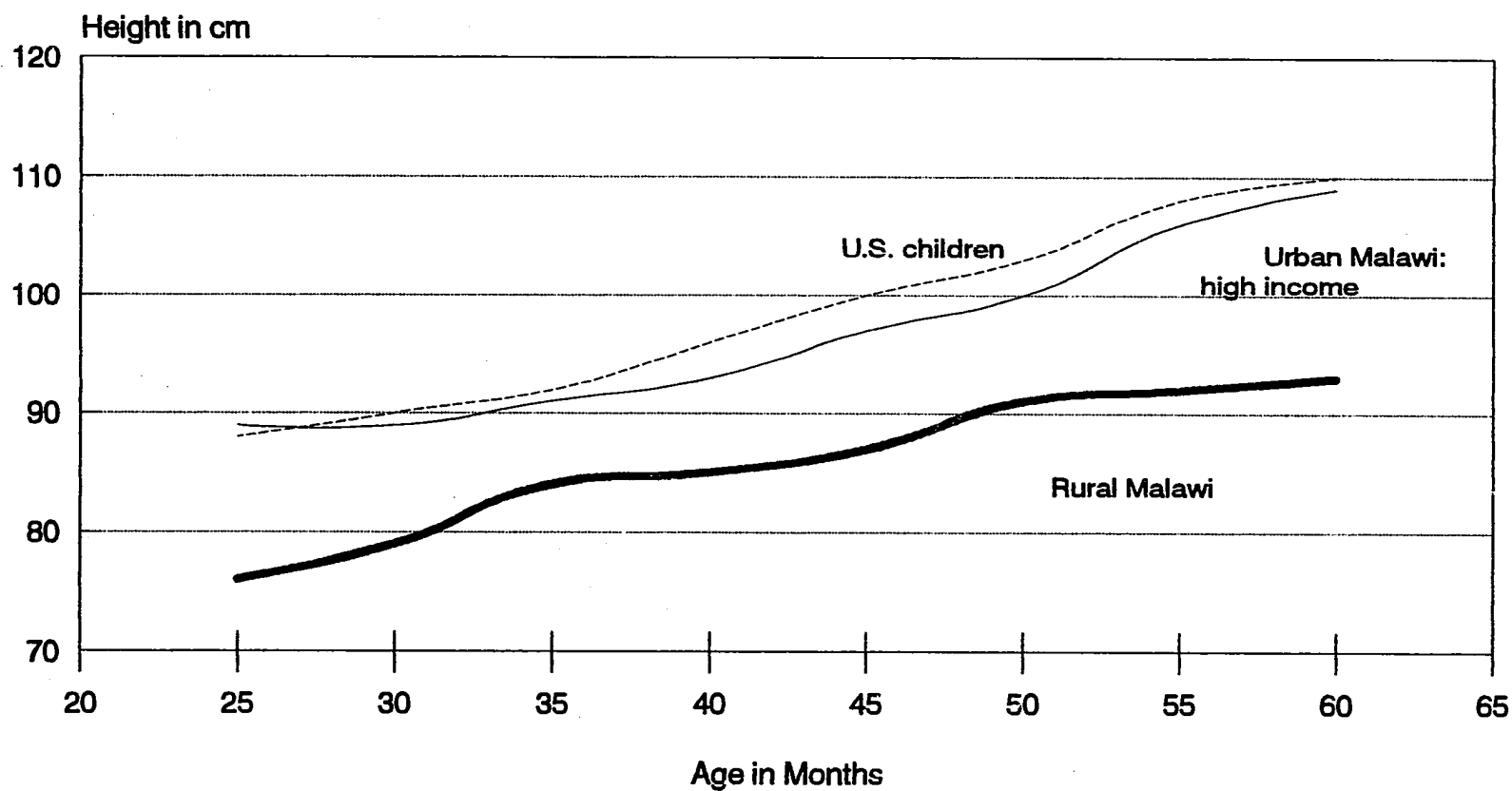
Malnutrition

Although agriculture and food production are primary occupations and source of income in Malawi, malnutrition is highly prevalent. The National Sample Survey of Agriculture for 1980-1981 revealed that approximately 56 percent of children under age 5 in rural Malawi suffer from chronic malnutrition as measured by stature or height by age. Although there has not been a more recent nationwide survey, older smaller surveys suggest the problem has not diminished. A 1989 survey in Ntchisi, for example, showed that 70 percent of children surveyed suffered from chronic malnutrition. Malnutrition is seen among the urban poor as well. A recent study estimated that 42 percent of children surveyed in Blantyre and 35 percent of children in Lilongwe were chronically malnourished.

The short stature of Malawian children consistently found in past studies led to investigations of the appropriateness of the standard against which stature was compared. It was felt that perhaps the observed low height for age may be the result of genetics rather than poor nutrition and health. A 1990 study, however, provided evidence to refute this hypothesis. A sample of urban Malawian children from high-income families compared favorably with the established standard of U.S. children of the same ages, whereas rural Malawian children were on average about 10 cm (4 in.) shorter (Figure C. 7).

Protein-energy malnutrition is the primary nutritional problem, although specific nutrition deficiencies have been identified. Iron-deficiency anemia is the most commonly reported nutritional problem among women and children, contributing to low birthweight, perinatal problems in pregnant and lactating mothers, and chronic fatigue and ill health. Important causes are poor nutritional intake of iron accompanied by increased blood destruction and loss, particularly from malaria and schistosomiasis. Vitamin A deficiency is a public health concern in the Lower Shire Valley. A 1988 survey in Salima and Dedza East estimated

Figure C.7
Nutritional Status of Children
(average height by age)



Source: Food Security & Nutrition Bulletin, Government of Malawi, 1991

110

that 22 percent of the sampled population showed signs of vitamin A deficiency. Children suffering from vitamin A deficiency have more attacks of diarrhea and respiratory infections, and severe deficiency causes blindness and death.

The immediate cause of malnutrition is that people, especially children, are not getting adequate food to satisfy their body's requirements. In Malawi, there are several reasons for this: lack of food availability at the household level, poor feeding and childrearing practices, and the effects of disease. The important relationship between nutrition and infection particularly affects children. Poor nutrition lowers the body's resistance to infection, leading to more frequent infection and slower recovery so that diseases, such as measles and diarrhea, which are rarely fatal in developed countries, become major childhood killers. At the same time, infection can also interfere with food intake and absorption, thus potentiating the effects of poor nutrition.

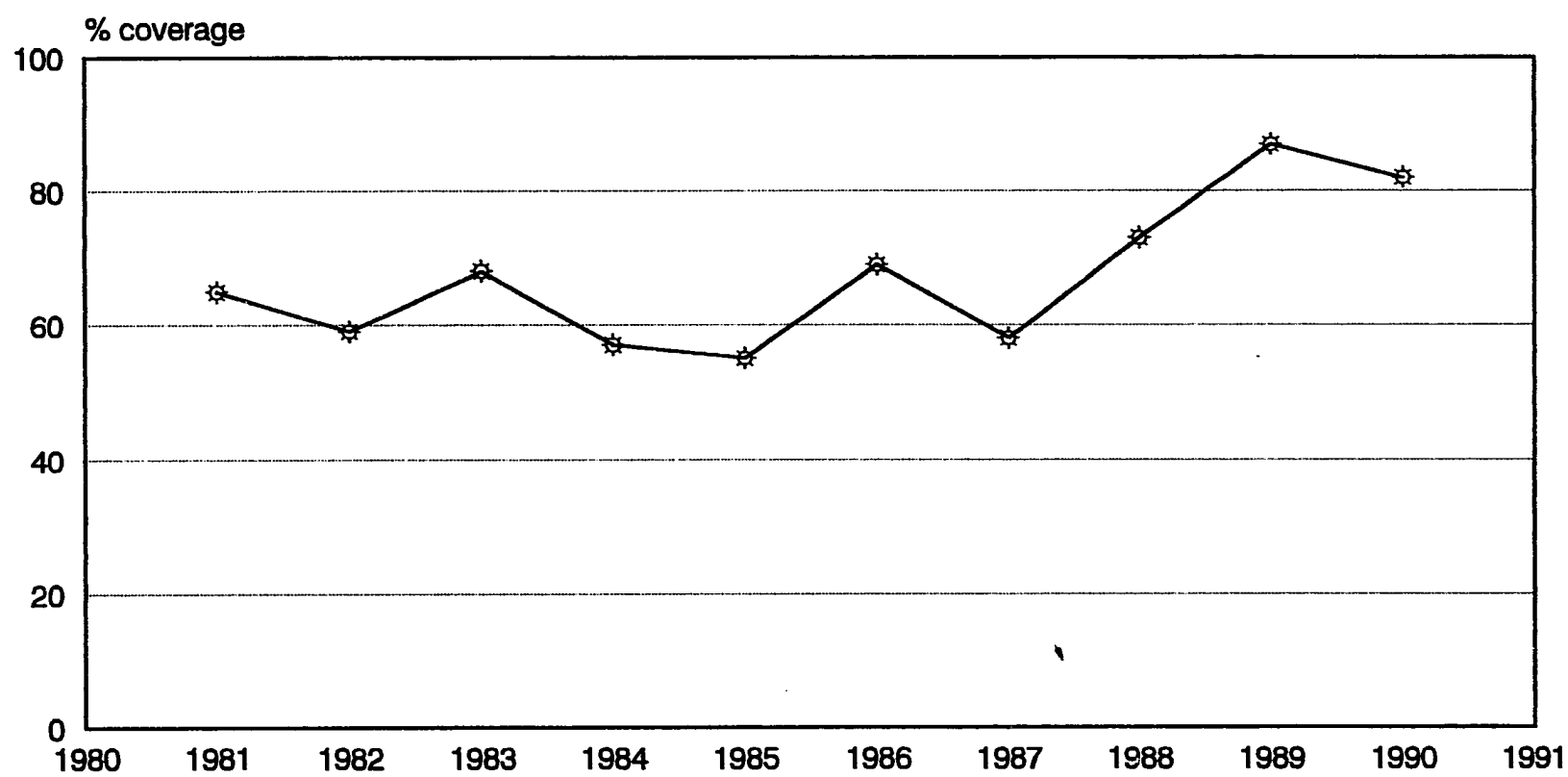
On average (in 1984) Malawian children were breastfed for 17.4 months, with somewhat shorter durations in urban areas. However, closely spaced births often lead to early and abrupt termination of breast-feeding. A 1989 study showed that 38 percent of urban mothers stopped breast-feeding because of another pregnancy. In addition, many early teenage pregnancies are unwanted and young mothers commonly give their young children to grandmothers for care in order to finish school or work, depriving the child of breast-feeding.

Measles and Other Vaccine-Preventable Diseases

Measles has declined as a cause of both morbidity and mortality over the past two decades, but still remains a significant cause of child mortality. Rates of infection among children under 5 dropped by one-half from 1985 to 1989, from 707 cases/10,000 to 327 cases/10,000, as a result of increased immunization coverage from about 65 percent in 1981 to 80 percent in 1990 (Figure C.8).

Most children in Malawi are currently immunized against the other primary vaccine-preventable diseases. Rates of immunization have consistently increased since the early 1980s when 65 percent of children were fully immunized. In 1990 it was estimated that immunization coverage was over 90 percent for BCG; about 80 percent for diphtheria, pertussis, and tetanus toxoid (DPT) and polio (3 doses); and 72 percent for tetanus (2 plus doses) in 1989 (Figure C.9). These rates are higher than those found in most of East and Southern Africa.

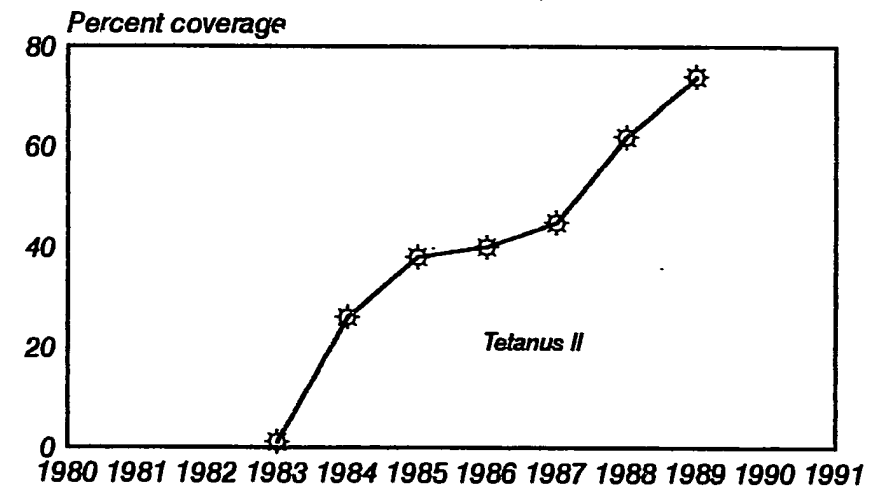
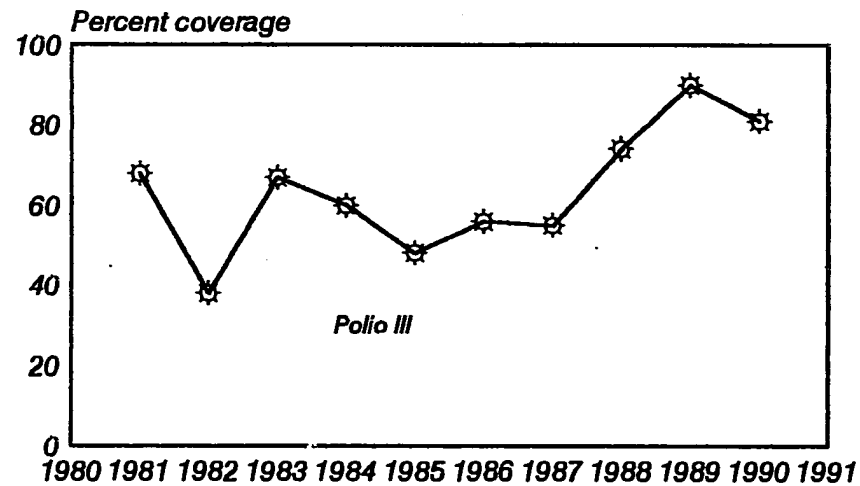
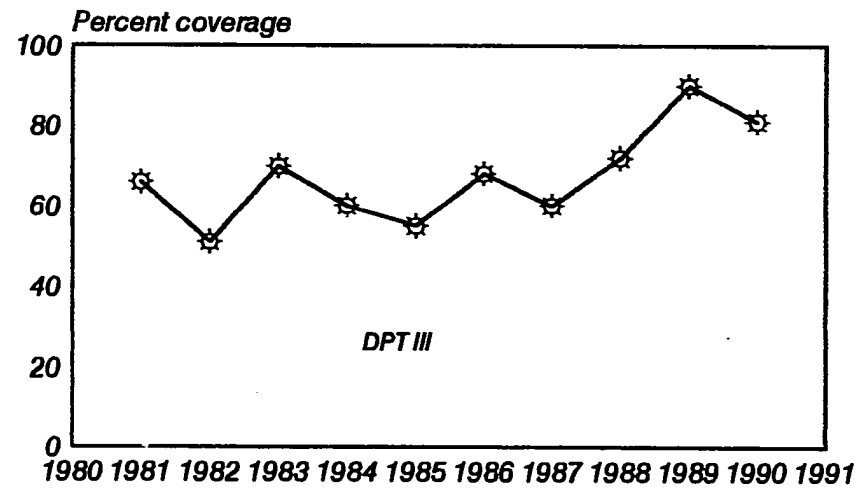
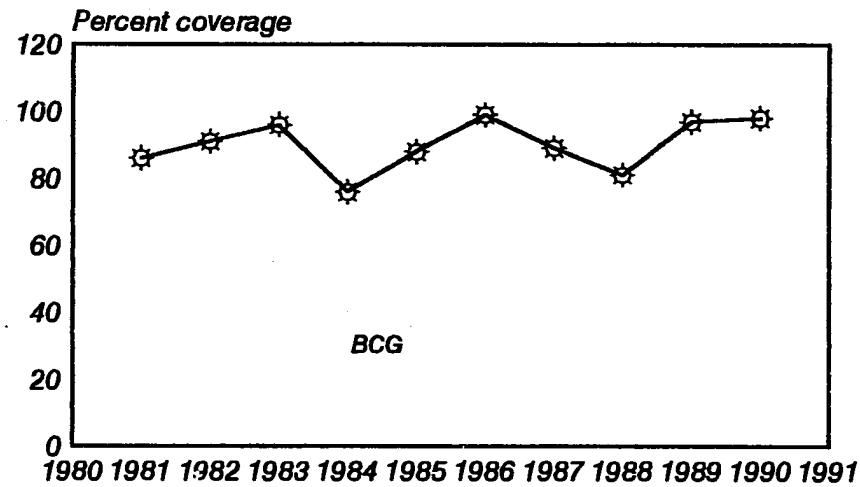
Figure C.8
Measles Immunization Coverage Rates



Source: Center for International Health; International Science and Technology Institute, June 1991.

112

Figure C.9 Immunization Coverage Rates



Diarrheal Diseases

In the overall population, morbidity rates from diarrheal diseases showed a 50-percent decline from 1980 to 1989, although they still represent over 9 percent of all child hospitalizations and 7 percent of all inpatient child deaths. These figures are based on reports from health facilities only and are likely to underrepresent the prevalence in the total population. Evidence suggests that mothers may be less likely to take their children to health facilities for diarrhea compared with other illnesses (Banda 1992). Although access to oral rehydration therapy was estimated at 56 percent in 1989 (from 25 percent in 1985), oral rehydration salts are estimated to be used appropriately in less than 20 percent of diarrheal cases. These rates are considered low in comparison with those for other countries in the region.

AIDS

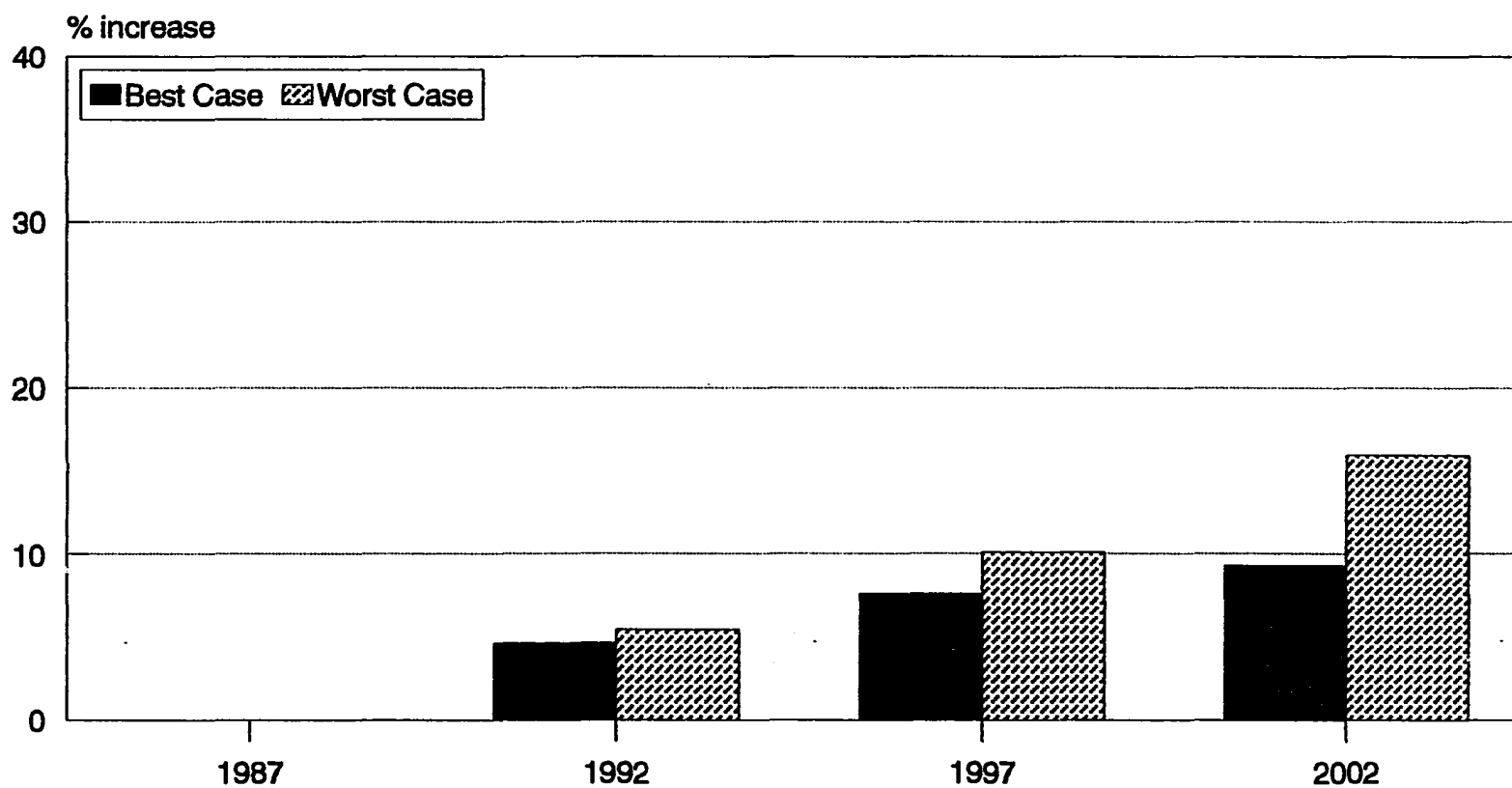
In 1990 approximately 130 cases of AIDS were reported among children under age 5, representing about 5 percent of the total number of reported AIDS cases. Although this number is relatively small at this time, it will continue to increase dramatically in the future, and each case will result inevitably in death.

HIV/AIDS primarily affects the young and middle-aged sexually active population, who are the most economically productive members of society, but the impact on children is grave. It is estimated that women with HIV pass it on to their children in about 30 percent of cases, and progression of the disease is more rapid in children. Some studies estimate that as a result of HIV, infant mortality rates may increase by as much as 50 percent over the next 10 years. Official Ministry of Health estimates project as much as a 16-percent increase in infant mortality and a 34-percent increase in child mortality over what would occur if there were no AIDS by the year 2002 (Figures C.10 and C.11).

These estimates do not take into account the impact on children of being orphaned by parents who succumb to AIDS. As of March 1991, there were 15,700 confirmed AIDS cases. A.I.D./Malawi estimates there may be as many as 400,000 adults infected with HIV. The Ministry of Health projects that by 1995 AIDS will kill 40,000 adults annually, and the toll is expected to climb sharply thereafter. By the year 2000 it is projected that several hundred thousand children may be orphaned by AIDS, producing serious consequences for the health and well-being of Malawi's children.

114

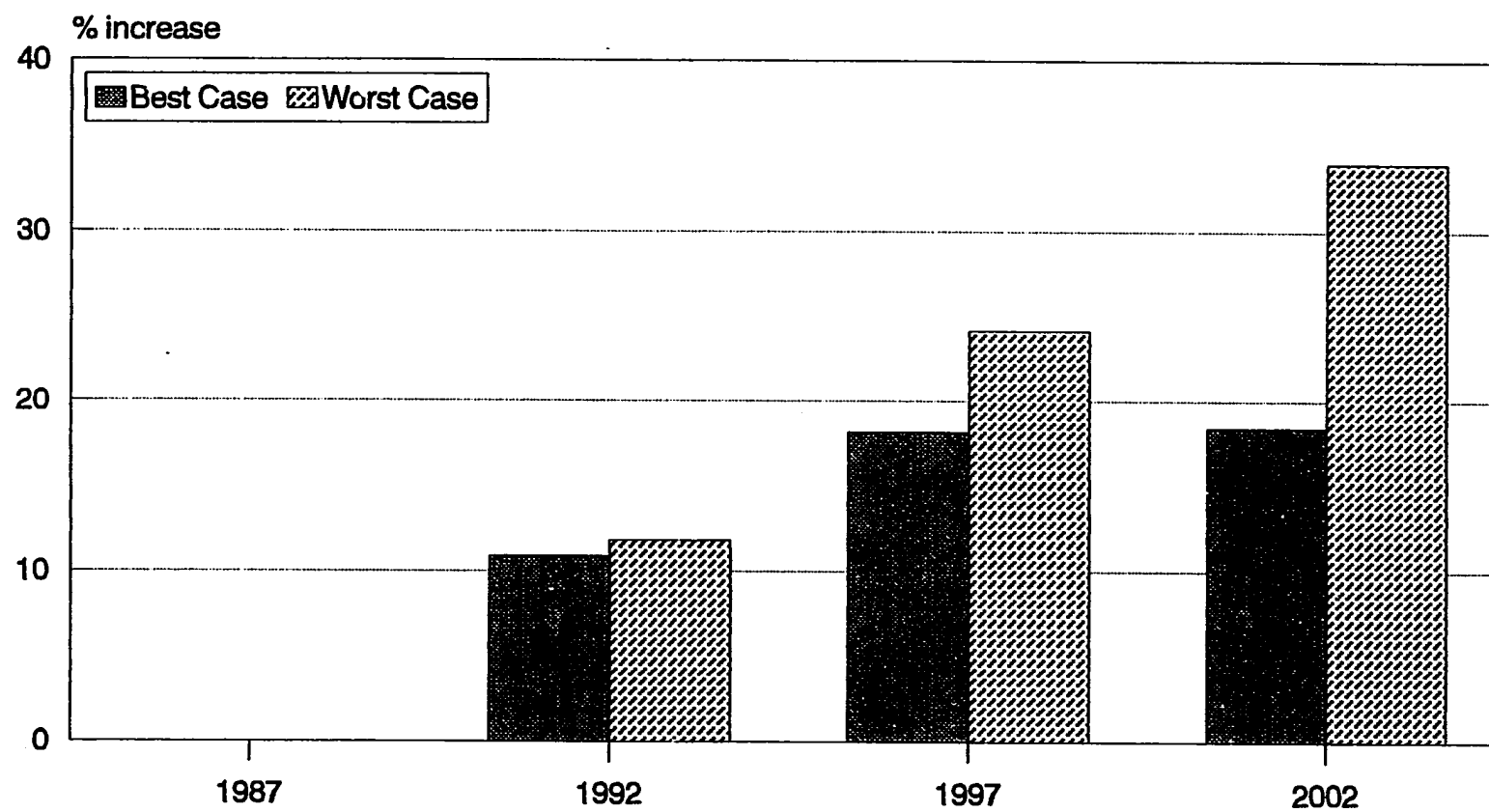
Figure C.10
Projected Increase in Infant Mortality
Rates Due to AIDS



Source: AIDS Secretariat/Ministry of Health, March 1991

115

Figure C.11
Projected Increase in Child Mortality
Rates Due to AIDS



Source: AIDS Secretariat/Ministry of Health, March 1991

HIV prevalence among adults was estimated at about 10 percent nationally in 1990 (with a range of 3 to 20 percent, depending on the sample), but this estimate was based on two healthy adult populations: blood donors and women attending antenatal clinics. HIV prevalence is thought to be lower among the rural population, but no studies have been conducted. Among those populations that have been sampled, the prevalence rate is climbing rapidly. Seroprevalence among urban women of reproductive age seen at Queen Elizabeth Central Hospital in Blantyre rose from 2 percent in 1985 to 26 percent in 1991 (Figure C.12).

The full impact of the AIDS epidemic is difficult to predict, although evidence is clear it will affect virtually all aspects of society. The pool of talent in government, industry, and academia is being thinned; and productivity in the agricultural labor force is expected to decline. The health sector is already experiencing a strain. Up to one-third of all hospital admissions are due to HIV-related diseases with AIDS-related tuberculosis also showing dramatic increases. It is placing enormous demands on the health care system, consuming scarce resources that otherwise might be allocated to primary health care.

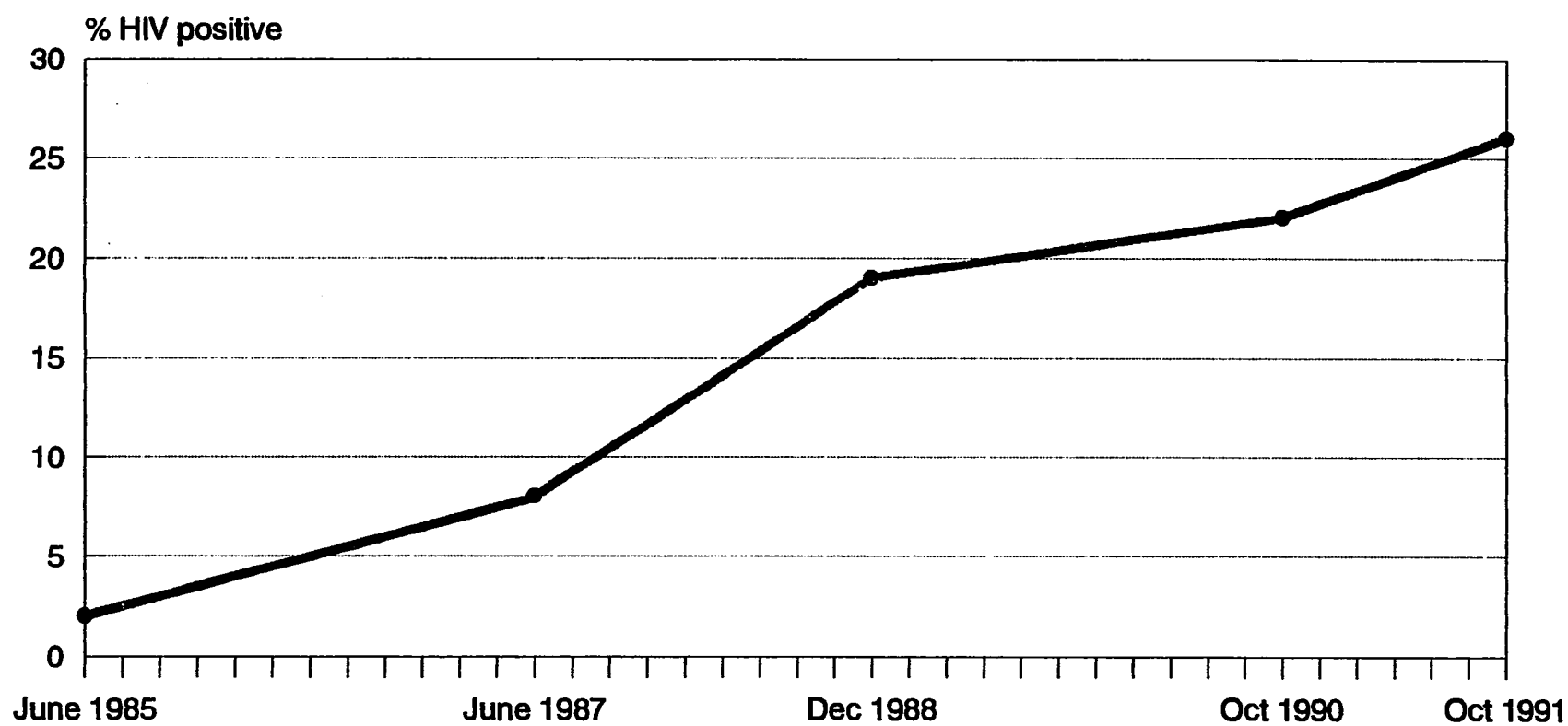
High Fertility and Maternal Health

The fertility behavior of Malawian women places them and their children at increased risk of morbidity and mortality. Worldwide research has demonstrated that closely spaced births, births to very young and very old mothers, and high-parity births increase risks for both mothers and children. Evidence from the 1984 Family Formation Survey indicates that among births occurring between 1975 and 1979, the child mortality among children born within 2 years of a previous birth was nearly twice that of children spaced 2 or more years apart.

In Malawi, nearly one-fourth of all births occur within 2 years of a previous birth, with an average interval of 2.3 years; 14 percent of all births occur to teenage mothers, and 7 percent occur to mothers over age 40; over one-half of the births to women over age 40 are parity 7 and higher. High fertility is in part a response to high rates of infant and child mortality—almost every family experiences the death of a child and the birth of another child is some compensation. However, this pattern of fertility is itself contributing to elevated mortality.

Access to family planning services, referred to in Malawi as child spacing services, has improved over recent years, but in 1990 only 200 out of 748 health facilities offered such services. In 1984 about 1.6 percent of women of repro-

Figure C.12
HIV-1 Seroprevalence Among Women
Antenatal Clinic
Queen Elizabeth Hospital, Blantyre



Source: AIDS Secretariat/Ministry of Health, 1991

ductive years were currently using modern contraception (Family Formation Survey); this figure was estimated at about 3.4 percent in 1989. The Demographic and Health Survey for 1992 will provide much needed current information on fertility and child spacing practices in addition to infant and child morbidity and mortality estimates.

Maternal mortality, or deaths to women because of pregnancy and childbearing causes, is extremely high in Malawi. Estimates of the maternal mortality ratio range from 100 to 850 maternal deaths per 100,000 births, depending on the subpopulation studied and the methodology used to estimate the statistic (Figure C.13). A community study conducted in Thyolo District in 1989 estimated that the lifetime risk of a woman dying from pregnancy- and childbirth-related causes is 1:32. Limited access to health facilities when labor complications arise is a significant contributing factor to maternal mortality. A study of 12 hospitals conducted in 1989 indicated, however, that while patient delay accounted for 20 percent of maternal deaths, deficient care to women who attended a hospital contributed to mortality in almost one-third of the cases.

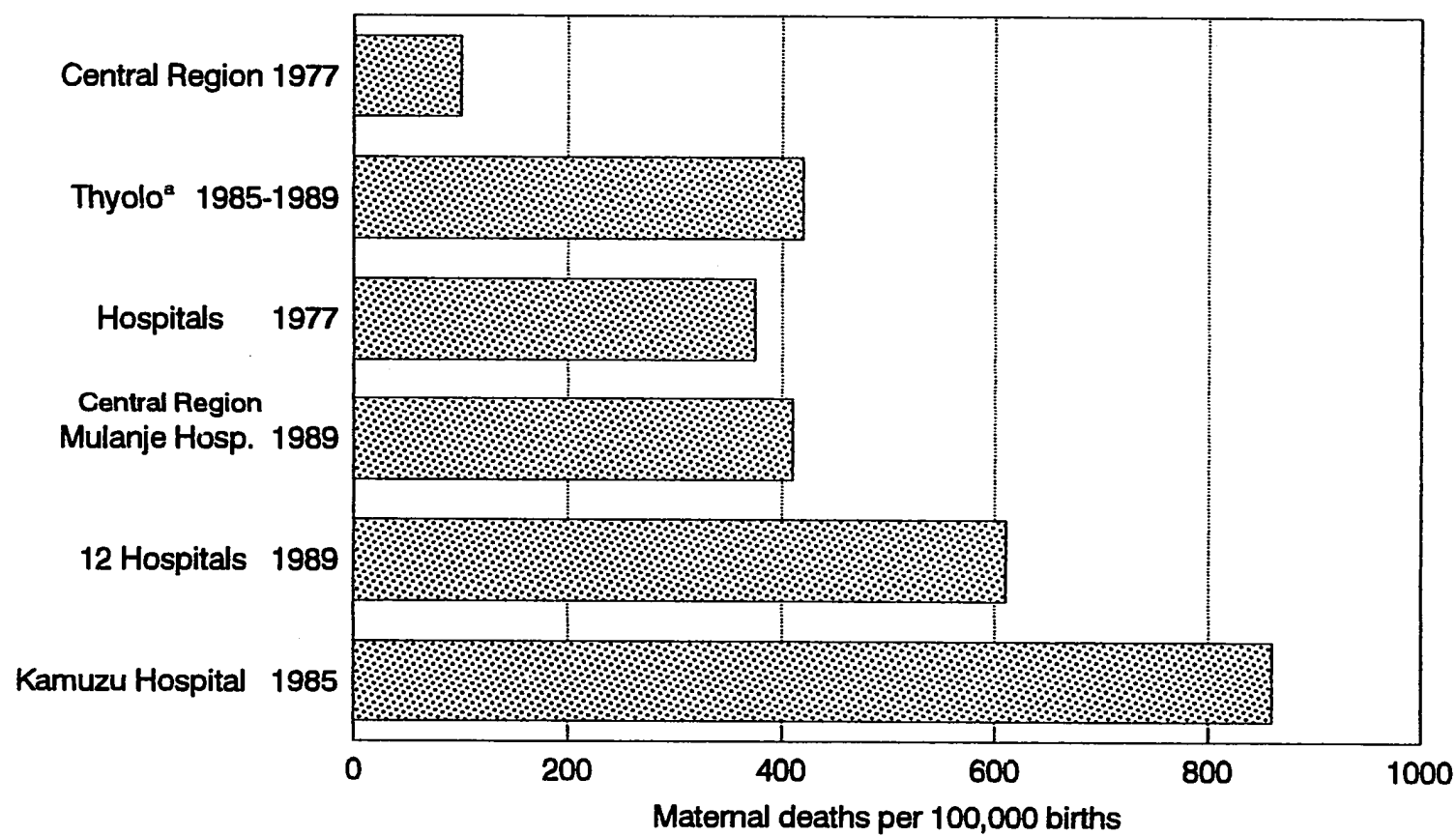
The death of a mother has a devastating effect on her family. The Thyolo study found that of the full-term infants born alive to mothers who died in childbirth, over 60 percent did not survive to their fifth birthday.

In 1989 the Ministry of Health estimated that only 41 percent of births were attended by health workers or trained birth attendants, although this figure was a 69 percent increase from the 1984 Family Formation Survey figure. In 1989, 76 percent of women received antenatal care at least once. In the Thyolo study, antenatal care did not necessarily lead to reduced maternal mortality. When the information was known, 80 percent of the women who died from maternal causes had received some antenatal care.

High fertility and a young population mean that a large number of women are pregnant most of their reproductive lives. They require antenatal, perinatal, and postnatal care for themselves and their children. In 1987, children under age 5 and women of reproductive age made up 43 percent of the total population. Even if population growth begins to slow in the near future, this subpopulation will number close to 5 million in 20 years. Mothers and children are at elevated risk of disease and mortality. Their large numbers place great demands on the fragile health care system and make improvements difficult.

119.

Figure C.13
Maternal Mortality Ratio



^a Based on Thyolo Community Study of 1989.

Source: World Health Organization; Maternal Mortality Factbook, 1991

120

Socioeconomic Correlates of Infant Mortality

The relationship between socioeconomic factors and infant mortality has been demonstrated worldwide. Analysis of district-level information indicates that socioeconomic status is related to infant mortality in Malawi. Table C.1 shows the relationships among the 1977 and 1987 district-level infant mortality rates and five socioeconomic and demographic indicators measured in the censuses: female literacy rate in 1987, population density in 1987, percent increase in population size from 1977 to 1987, crude birthrate in 1987, and percent of the population with toilet facilities in 1987. Also included is an estimate of district-level immunization coverage (percent fully immunized) provided by the United Nations International Children's Emergency Fund.

Infant mortality rates in 1977 and 1987 are highly correlated with each other, and the percent reduction in infant mortality is positively related, although not significantly, to 1977 levels; that is, the higher the infant mortality rate in 1977, the greater the reduction. This finding should be treated with caution, however, because it may be an artifact of the estimation techniques used to obtain the infant mortality rates.

Higher rates of female literacy and higher population percentages with toilet facilities are highly associated with lower infant mortality rates. Female literacy is also positively correlated with mortality reduction. Female literacy and toilet facilities are highly correlated with one another, suggesting that they may both be representing the economic well-being of the districts.

Greater population increase from 1977 to 1987 is associated with higher infant mortality in 1988, and the crude birthrate in 1987 is positively correlated with both 1977 and 1987 mortality rates. No statistically significant relationship was found between immunization coverage rates and any of the other variables.

The degree to which these variables explain variation in infant mortality was investigated by fitting two regression models: one for the 1987 infant mortality rate and one for the percent reduction in infant mortality. The results are presented in Table C.2.

Infant mortality in 1987 was fit as a function of female literacy rate, percent of the population with toilet facilities, population increase, 1987 crude birthrate, and immunization coverage. Together these variables explain 83 percent of the variation in infant mortality among the districts. Most of this variation is explained by female literacy and crude birthrate. Toilet facilities explained very little variation not accounted for by female literacy. Percent reduction in infant mortality from 1977 to 1987 was fit as a function of infant

121

Table C.1
Correlations Among Infant Mortality Rates, Socioeconomic and
Demographic Indicators Across Districts

	1977 IMR	1987 IMR	% IMR Reduction	Female Literacy Rate, 1987	Population Density 1987	Population Increase 1977-87	Crude Birthrate, 1987	% of Population w/Toilet Facilities	% of Children Fully Immunized
1977 IMR	1.00	0.81 ^a 0.0001 ^b	0.28 0.18	-0.59 0.003	-0.10 0.63	0.20 0.35	0.47 0.02	-0.66 0.0005	-0.03 0.88
1988 IMR		1.00	-0.33 0.11	-0.80 0.0001	0.01 0.98	0.39 0.06	0.42 0.04	-0.75 0.0001	0.11 0.62
% IMR Reduction			1.00	0.35 0.09	-0.21 0.31	-0.26 0.21	0.04 0.84	0.16 0.46	-0.25 0.25
Female Literacy Rate, 1987				1.00	-0.00 0.99	-0.50 0.01	-0.01 0.97	0.66 0.0005	-0.09 0.67
Population Density, 1987					1.00	-0.43 0.04	-0.38 0.06	0.30 0.15	0.02 0.93
Population Increase						1.00	0.11 0.59	-0.58 0.00	0.05 0.80
Crude Birthrate, 1987							1.00	-0.38 0.06	0.18 0.39
% of Population w/Toilet Facilities								1.00	-0.15 0.49
% of Children Fully Immunized									1.00

^aPearson correlation coefficient.

^bProbability that the coefficient is statistically different from zero.

122

Table C.2

Regression Analysis Results of Socioeconomic Correlates
of Infant Mortality

Independent Variables	Parameter Estimate		p-value
<i>Dependent Variable: 1987 Infant Mortality Rate</i>			
Intercept	144.5	(40.10) ^a	.002
Female literacy rate	-1.31	(0.251)	.0001
Percent of population with toilet facilities	-0.34	(0.236)	.17
Population increase	-0.19	(0.169)	.26
1987 Crude birthrate	2.24	(0.720)	.006
Immunization Coverage	-0.10	(0.190)	.60
<i>Dependent Variable: Percent Reduction in IMR From 1977 to 1987</i>			
Intercept	-0.36	(0.145)	.02
1977 IMR	0.002	(0.0005)	.001
Female literacy rate	0.005	(0.0013)	.002
Population increase	-0.0001	(0.0008)	.89

^aStandard error of the estimate

-123-

mortality in 1977, female literacy rate, and percent increase in population size from 1977 to 1987. These variables explained 49 percent of the variation in the dependent variable. The results suggest that reduction in mortality was greater among districts with higher mortality in 1977, and additional variation is explained by female literacy.

These results indicate the importance of socioeconomic factors to infant mortality. The analysis cannot, however, clarify the causality of the relationships. For example, it is not known whether the presence of toilet facilities leads directly to lower mortality as a result of improved sanitation, or whether toilet facilities are a proxy for more general economic well-being and, therefore, better access to quality health care.

124

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